

FIND OUT

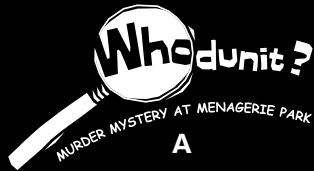


A FORENSIC SCIENCE RESOURCE BOOK FOR TEACHERS



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FIND OUT



A FORENSIC SCIENCE RESOURCE BOOK FOR TEACHERS

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SKILL-BASED ACTIVITIES

This section focuses on a variety of Forensic skills set within student friendly activities.

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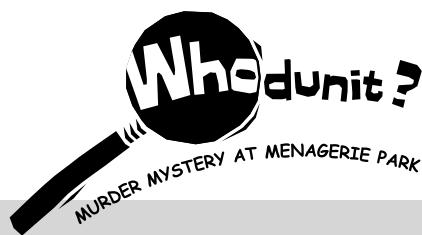


CROSS CURRICULUM ACTIVITIES

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INTRODUCTION



Whodunit? Murder Mystery at Menagerie Park was designed and constructed by Scitech. The exhibition involves the mystery of a missing rare animal from an animal park and the death of a security guard. Several park members are implicated, and the exhibits comprise forensic science activities which supply information as to who may be guilty.

This book contains many ideas for you to use in your classroom either before or after a visit to *Whodunit?* Murder Mystery at Menagerie Park. The ideas can be modified to be used at any level of schooling. The suggested activities are not an exhaustive list, and there are many other resources which you could use.

The structure of the book has been designed to allow flexibility in planning, and to cater for various levels of confidence and knowledge. The sections of the book may be used in conjunction with each other or separately. You, as the teacher, remain in control of the curriculum. However it is used, the direct links to the learning areas make this a valuable resource in achieving worthwhile outcomes for the students.



INTRODUCTION

History of Forensic Science

Attempts at the scientific detection of criminals have been made for several centuries, but in the past 100 years the progress of forensic science has been amazing. The magnifying glass has been supplemented by ultra-violet light, DNA profiling, microscopes, computers and other sophisticated tools. However, the basic principle of human observation, including intuition, remains the most important tool in forensic science. Without it, the appropriate science may not be used.

Mystery and crime are part of everyone's life, whether in our imagination, through books and movies, or in real life. The word 'forensic' comes from the Roman 'forum', which is where the Romans used to hold their meetings on matters of law. So 'forensic science' refers to science which is used in courts of law.

Forensic scientists are usually involved in an investigation from the very beginning: from the collection of evidence at the scene of the crime to the presentation of the analyses of that evidence in court.

The basic principle involved in the collecting of physical evidence is that any person who has been at the crime scene will inadvertently leave something behind and take something away. When your students collect, identify, compare and draw conclusions from the evidence, they become detectives and forensic scientists. The different types of scientists who are involved in forensics include pathologists, dentists, biologists, toxicologists, chemists, entomologists, photographers, coroners and psychologists.

EDUCATIONAL OUTCOMES

Curriculum Links Overview

Many of the exhibits and themes in *Whodunit? Murder Mystery* at Menagerie Park link with outcomes from the Science, Technology, Mathematics, and Society and Environment Learning Areas.

The suggested list of possible links may help you with your planning. The level of outcomes achieved by students visiting the exhibition will depend on their developmental level, and the activities which are undertaken before and after their visit.

Science in Society

Students understand the nature of science as a human activity.

Key Understandings

- Students learn that science is questioned and evidence examined and judged.

Science in Daily Life

Students select and apply scientific knowledge, skills and understandings across a range of contexts in daily life.

Key Understandings

- Students recognise when scientific knowledge can be used to explain and predict events in their daily lives.
- Students synthesise scientific understanding with a range of other information to solve practical problems.

Investigating

Students investigate to answer questions about the natural and technological world using reflection and analysis to prepare a plan; to collect, process and interpret data; to communicate conclusions; and to evaluate their plan, procedures and findings.

Key Understandings

- Students process data by:
 - a) recording and classifying information in organised and logical ways
 - b) searching for patterns in results
 - c) linking new and old understandings
 - d) constructing explanations and solutions

Acting Responsibly

Students make decisions that include ethical considerations of the impact of the processes and likely products of science on people and the environment.

Key Understandings

Students have the opportunity to learn:

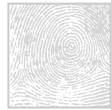
- the implications of their data and its impact on other people; and
- the importance of considering the accuracy and validity of data, as well as beginning to recognise the influences of beliefs and values on decision making.



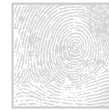
HOW TO USE THIS BOOK



There are several ways to use this book.
Here are some suggestions.



Select a 'Post-Visit' Activity.
p 5



and/or

Select a scenario.
pp 9 - 24

Dossier
You may wish to do this
activity first.
p 6



Refer to the Skills
Section.
pp 25 - 42



Locate skills needed
(found at end of your
chosen scenario).

and/or



Choose some of the
Cross Curriculum Activities.
pp 43 - 51





POST-VISIT ACTIVITIES

E English Learning Area

S Science Learning Area

- | | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------|
| <p>E Write your own ending to the Murder Mystery at Menagerie Park, using some of the evidence you collected on your visit to the exhibition. Make sure the solution you provide is consistent with the evidence at the crime scene, but add extra information to make your case more convincing. Either verbally, or in writing, convince the class that your ending is credible.</p> | <p>CF link :
Speaking and/or Writing</p> |
| <p>E Develop a script for a play based on what you have learned from the exhibition. Remember to give all the necessary clues in the dialogue or in the actions of the characters.</p> | <p>CF link :
Writing</p> |
| <p>E Role play a court room drama based on the scenario presented at the exhibition. Find out which people are required to be in court, how a jury is selected, what evidence is permissible, which barrister (prosecution or defence) speaks first and last, etc.</p> | <p>CF link :
Speaking</p> |
| <p>E Write the story from the culprit's point of view. How might he/she view it differently from the police? (Read Ronald Dahl's Book of Revolting Rhymes for ideas.)</p> | <p>CF link :
Writing</p> |
| <p>S E Be a journalist and prepare a report for a newspaper with headlines, interviews, etc.</p> | <p>CF link :
Writing (English)
Communicating Scientifically (Science)</p> |
| <p>S E Be a TV news reporter and video a report from the scene which includes a summary of the main events, interviews from witnesses and an evaluation of the evidence.</p> | <p>CF link :
Speaking (English)
Communicating Scientifically (Science)</p> |
| <p>S E Set up a formal debate about issues involved in forensic science, eg. DNA profiling or finger-printing large numbers of innocent people, should the punishment fit the crime, should the accused have the right to remain silent, is breaking the law ever justified, curfews for kids, finger printing at birth, use of force in protecting people and property, ownership of guns, the use of lie detectors, etc.</p> | <p>CF link :
Speaking (English)
Communicating Scientifically (Science)</p> |
| <p>S Brainstorm to list other pieces of evidence which might be required to prepare a watertight case for the court. How would you collect that evidence?</p> | <p>CF link :
Science in Society</p> |
| <p>S Create a time-line showing the main developments in forensic science over the past 200-years.</p> | <p>CF link :
Science in Society</p> |
| <p>S Suggest some forensic science developments which might occur in the future. For example, a device which traps the sound waves which have spread from a crime scene and replays them, or</p> | <p>CF link :
Science in Daily Life</p> |
| <p>S Research the roles of the various people involved in a criminal investigation. These could include police, detectives, pathologists, forensic scientists, dentists, biologists, toxicologists, chemists, entomologists, photographers, coroners, witnesses, psychologists, prosecutors, lawyers.</p> | <p>CF link :
Science in Society</p> |

DOSSIER

Dossier Instructions

- Give a copy of the blank dossier to each student to complete.
- The dossier can be completed as an exclusive class activity or incorporated with a skill activity (see below).
- Once the dossiers are completed they can be filed as a class set and be available for use by students in establishing suspects for any of the class-based scenarios.
- If the spaces on the dossier sheets are not large enough they can be enlarged on the photocopier or, alternatively, another piece of paper can be used.

Completing The Dossier:

Photo:

Students find a recent photo of themselves showing their face, preferably front on.

Fingerprints:

Using the fingerprinting technique outlined in the 'skills section', students make prints of the fingers and thumb on their right and then left hand.

Hair:

Students need to pull one or two strands of hair from their head, preferably from the roots.

Handwriting Sample:

Students write or print the sentence in their usual writing. Samples can be made in upper or lower case, printing or long hand.

Distinguishable Features:

Students describe any distinguishable features that are visible. These may include moles, birthmarks etc.

Other facts:

These could be any other facts specific to an investigation.

Footprint Sample:

Try using oil (a bit messy), watercolour paint or charcoal. Students put on a shoe and step into a low container containing the stain, step straight onto paper and then into water to wash it off. Line the items above into a straight line and allow enough room in between for the other foot to take a step. Encourage students to walk as normally as possible. Keep and label the footprint and keep it with the other dossier documents.



PAINT



PAPER



WASH



STEP



STEP

Some suggestions for using the Dossier with an activity from the Skill-Based Section:

- Leave mystery fingerprints on a piece of glass and use fingerprinting skills and the students' dossiers to find out to whom they belong, Activity 4.
- Microscope Skills could be tested by looking at hair samples and then matching them to those in the dossiers, Activities 14,15 or 16.
- Plaster of Paris casts of footprints left at a crime scene can be compared to the footprints in the dossiers, Activity 1.
- Analyse the handwriting of a ransom note and then match it using the dossiers, Activity 2.



LEARNING
MODULES

PERSONAL DOSSIER

Details

Date of Birth:

Gender:
(circle)

☐ M ☐ F

Belonging To

PHOTO

HANDWRITING SAMPLE

"The quick brown fox jumps over the lazy dog"

Height (cm):

Weight (kg):

DISTINGUISHING FEATURES
and/or other facts

HAIR

Blood Type:

Eye Colour:

Colour

Type

- ☐ Caucasian
☐ Oriental
☐ African
☐ Other

Treated?

- ☐ Perm
☐ Colour
☐ Other

HAIR SAMPLE



LEARNING
MODULES

PERSONAL DOSSIER

Belonging To

FINGERPRINTS

Right Hand:

Thumb

1st

2nd

3rd

4th

Left Hand:

Thumb

1st

2nd

3rd

4th



LEARNING
MODULES

SCENARIO 1

CLASSROOM CAPERS



Activity at a Glance

This fun classroom scenario works best when colluding with your school's gardener/cleaner or another member of staff who can be the 'culprit'. It can be run over a few days, ideally within one school week.

Scenario:

Have your favourite classroom guinea pigs, George and Gina, 'pignapped' (or any valued classroom pet, equipment or class-made item stolen) overnight from your locked classroom. As the teacher, you are the first to arrive. In the room you find a ransom note and decide to close off the room to preserve all evidence left at the scene of the crime. You ask your students to leave their bags outside, to seat themselves on the floor and to not touch a single thing in the room. When seated you give them the 'bad news'.

Through questioning, determine from the students what may have happened. Who would have had access to the room or would have been given a key, as there was no sign of a break-in?

Draw up a list of suspects -

Was it the Gardener?
The Cleaner?
The Principal?
Anyone from the Administration staff?
You, the Classroom Teacher?
The Support Teacher?
The Sports Teacher?

What do you need to look out for?
Do you think there could be evidence to find?
How can the evidence be preserved whilst collecting it?

Preliminary Preparation:

- You may want to coordinate the collection of evidence beforehand, to save time. (See next page).
- Enlist the support of a school staff member who will volunteer to be the 'culprit'.
- Have that person provide, at the appropriate times,
 - a hair sample
 - a fibre from a rag or clothing that they use/wear regularly\
 - fingerprints on a white staffroom coffee cup
 - a ransom note written in their own hand
 - a paint footprint impression left on the classroom floor or other surface which can be preserved eg. on a student's drying painting.
- Give the 'culprit' an additional but identical pen to that which was used to write the ransom note.



LEARNING
MODULES

CLASSROOM CAPERS

Collection of Evidence by a Special Class Team

1. Ransom note with a black felt pen with initials (*to match the name of the cooperating staff member*) or specific brand name pen found beside the note written by the 'culprit'.
2. White, plain coffee cup/mug (*with clear fingerprints on it*) from the staffroom found beside the note.
3. Fibre sample caught on a piece of the cage wood (*behind a splinter?*).
4. Hair sample found on bench outside the cage - is it human or animal? Collect some guinea pig hair from inside the cage for comparison.
5. Collect footprints left near the cage - culprit to step on drying students' paintings (*from the afternoon art lesson the day before*) that are left to dry on the floor of the classroom, and leave a clear footprint behind on another painting.
6. Photocopy the ransom note for handwriting analysis.



Dear Class,
I have stolen your pet guinea pigs, George and Gina. If you want to see them again, leave 4 sticky buns and \$20 by their cage by 4pm today.

Signed
The Phantom Pig Thief

Investigation:

1. Compile the list of suspects.
2. Take fingerprints of all 'suspects'. (*You may wish to save time by acquiring the fingerprints ahead of time from the 'suspects', using the Personal Dossier recording sheets on the preceding pages.*) Present them to the class at the appropriate time.
3. Attempt to match the coffee cup fingerprints with those supplied from the school staff.
4. Run a chromatography analysis of the ink on a piece of the ransom note.
5. Have students determine a 'prime suspect' (*eg, your chosen culprit*) or have two 'main suspects', perhaps by having two sets of fingerprints on the coffee cup. Or, the two suspects could use the same type of pen.
6. Assuming you have only the one prime suspect, invite the 'culprit' to the classroom and have students prepared with suitable questions to ask the 'culprit' and, with a warrant, get them to take appropriate samples of hair, fibres, footprint tread/pattern of shoes, etc. Otherwise, through a process of elimination, determine which of the two suspects is the prime suspect.
7. Determine if the 'culprit' could be the owner of the pen (*do a match with another pen found in the culprit's back pocket and run a chromatography test again on the ink of that pen, as well as making a match of the brand name*).
8. Analyse the handwriting and take samples from suspects in disguised forms, eg notes to the Principal, filling in forms, etc.

Through suitable questioning and analysis of evidence the students may determine 'beyond reasonable doubt' that the culprit has been found. Why did the cleaner/gardener do it? Why pignap George and Gina?

Possible Conclusions:

1. The guinea pigs were taken from the classroom for their own health and safety! The cleaner/gardener sprayed strong chemicals in the classroom to kill venomous spiders recently found in the classroom. The guinea pigs (along with other classroom pets) are sensitive to chemical sprays and need to be removed before spraying occurs and kept away from the sprayed area for 2-5 days. They are safe and sound at the 'culprit's' home and would be returned in the next few days! The ransom note was a 'red herring', just a bit of fun designed to cause a stir!
2. If electronic equipment is involved it could have been 'removed' for repair and perhaps it was you, the classroom teacher, all along!
3. Perhaps the Sports Teacher 'stole' (borrowed) the class's special or new sports equipment from the classroom for a special practice session for the Athletics Carnival or Inter-School Sports Day.

Relevant Skills:

- Hair matching, Activity 16 or 17
- Footprint matching, Activity 1
- Handwriting analysis, Activity 2
- Ransom note chromatography, Activity 3
- Fingerprint recording and analysis, Activities 4 and 5
- Fibre analysis, Activity 11

LEARNING
MODULES

SCENARIO 2

SPORTS DAY

The scenario provided below is to be read to the students or photocopied for the students to read. Teacher information is provided on the following page, in the form of questions to be investigated and details of the evidence found at the scene, which you will need to provide.

Evidence can be placed at student work-stations where the students can work in groups of three to analyse it. Solving this mystery will probably take at least two science lessons.

STORY

Bang! And they were off. Pat sprinted to the lead and out of sight as everyone expected, but that was a tactic Pat always used. Everyone else set off at a more leisurely pace, saving themselves for the sprint at the end. They fully expected to catch Pat, who would tire quickly, before too long. The parents and other spectators settled down to wait for the first sight of the leaders emerging from the bush track. One of the parents, Mr Carlton, arrived a little late, a bit flustered, and glanced quizzically at Pat's mother, Mrs Bennet.

After a while, one of the teachers who was acting as a judge for the race moved closer to the finish line. The spectators could see a white cap moving quickly above the bushes.

'They are in sight,' said Mr Carlton. 'I wonder who is in front?'

'My goodness! It's Pat! The others didn't catch up this time,' exclaimed Mrs Bennett. 'How exciting, this will be Pat's first win ever in a cross-country race.'

Pat crossed the finish line, and threw the white cap into the air. It was a few more minutes before the rest of the group emerged from the bush. They sprinted to the finish, and Sam crossed the line to take second place.

'Where did you get to?' Sam panted to Pat. 'We didn't see you the whole way. We've never had any trouble catching you before.'

Pat replied with a smug look, 'My tactics worked this time. I was way ahead of you. The trophy's mine.'

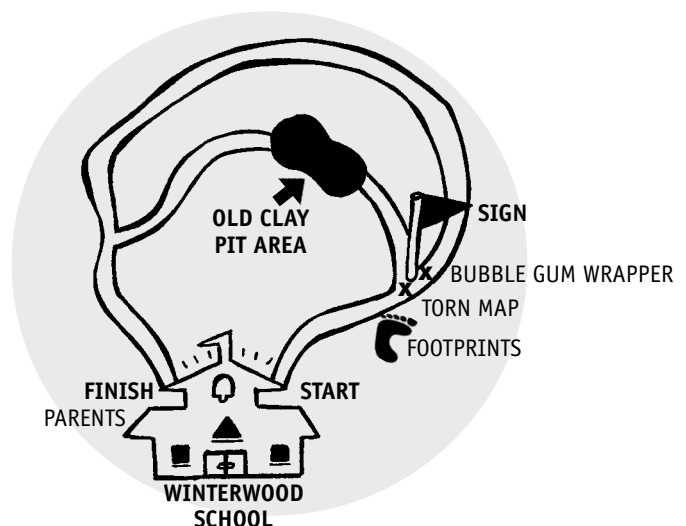
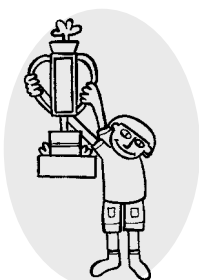
Mr Carlton, who had been watching and listening carefully, suddenly shouted, 'No it's not. You cheated! I saw you catching a bus as I was coming to the oval. You didn't run the whole way, that's why you won.'

Pat's face turned pale. 'How could you accuse me of cheating! I won fair and square. I followed all of the signs on the track, and I got here first.'

Mrs Bennett chimed in. 'Pat's not a cheat. How dare you!' she glared at Mr Carlton.

'I know what I saw! It was Pat, I can give you a detailed description,' retorted Mr Carlton.

'Calm down, everyone,' said the teacher. 'We will need to investigate these allegations. Come with me, Mr Carlton, and I'll take the details of what you saw. I'll need some other volunteers to help me to check the track.'



LEARNING
MODULES

SPORTS DAY

Evidence Found at the Scene:

The investigations team finds the following evidence *(to be provided by the teacher)* -

1. The first sign post at the fork in the track had been changed to direct the runners along a longer and more difficult route.
2. A bubble gum wrapper and a torn map of the cross-country course, with a fingerprint of grease/paint on it, were found beside the sign post. Footprints of one particular tread/pattern were clearly found around the sign, just off to the right of the track.
3. A clay mud stain on Pat's shoes, that no other runner has on their shoes.
4. A witness report identifies the person boarding the bus as having blond hair with a green cap, wearing the school's distinctive sports uniform and sunglasses, height being approximately 160 cm, of slim build and wearing black running shoes and carrying a Winterwood School Bag.
5. A roll call is made and four students are missing from the observation area. A list of these possible suspects is drawn up.
6. search of school bags reveals bubble gum in all but Pat's bag. A torn corner of paper in Kim's bag matches the torn map found near the sign post.

Questions to be Investigated:

- When was the sign tampered with?
- Who changed the sign?
- Why would they want to send the runners off course?
- How could the footprints found on the course be used to find the culprit?
- What might the sample of mud from Pat's shoes indicate?

Preliminary Preparation for the Teacher:

- Map of the course showing the longer route as well as the planned one
- Bubble gum wrappers
- Torn map with the piece found in the school bag.
- Fingerprints of the five suspects and the sample from the scene
- Footprints of the five suspects and the sample from the scene
- Witness report

Use the table to sort out the evidence.

	Robin	Kim	Chris	Shannon	Pat
Footprint					
Fingerprint					
Torn map					
Bubble gum					

Relevant Skills:

- Fingerprint analysis, Activity 4
- Paper tear analysis, Activity 10
- Soil analysis, Activities 8 and 9
- Footprint matching, Activity 1
- Sequencing of events, Activity 7
- Map reading, Activity 6

A Possible Conclusion:

Kim was dropped from the Cross Country Team due to missing several of the practice sessions. Annoyed at being dropped, Kim decided to make all the Cross Country runners go the long and arduous route but didn't realise Pat had already passed the signpost before it was changed.

The muddy clay stain on the shoes indicates that Pat went through the old clay pit area, which, flooded after recent rain, was on the original and correct course (see map).

The Witness Report was later proven to be a case of mistaken identity as Pat's cap was white and not green. One of the team members, Shannon, had been given permission to go home due to illness, and was possibly the person with the green cap seen boarding the bus.

Follow Up Activities:

The class can decide what should be done about the trophy. Does Pat deserve it, or should the race be run again? Are there any other suggestions?

Set out the complete sequence of probable events. Describe other circumstances which might have brought about the same result.

Have the students write a report for the local newspaper or school newsletter describing the incident. Don't forget to include a report from the culprit's point of view.

Decide on an appropriate punishment.

Cross-curriculum Activities

- Reporting
- Draw a Description



LEARNING
MODULES

SCENARIO 3

SABOTAGE

ON THE STARSHIP FORENSIC

Aim

- To go through the scientific process of hypothesising, planning, analysing and drawing conclusions.
- To actively discuss and participate in crime solving.

Scene

Starship Forensic travelling through space to explore the Cosmos:

- Ship's bridge
- Engineering tunnels

Storyline

It is night time, most of the crew is asleep and the Starship Forensic is travelling in the Crime Sector. The lights turn off and on and then off completely with only the emergency lights working. The ship's engines come to a halt and the emergency warning sirens come on.

The captain races to the ship's bridge, asks for a report and orders all senior staff to report to the bridge.

The chief engineer reports that there appears to be a major fault in the power supply and that emergency lighting, heating and air purifying filters are on. In only four hours the air will run out and the temperature will be too cold for survival.

The captain asks the engineer and the crew to investigate the cause of the power cut. They return to the bridge to tell the captain that the emergency stop panel has been smashed open. All the wires have been cut and a vital computer chip has been removed!

An extortion note has been left at the scene of the crime. It says: 'The Captain must return the ship to planet Earth. If the Captain refuses, the chip will not be returned - I would rather die than keep on exploring space for one more day and everyone will have to die with me!'

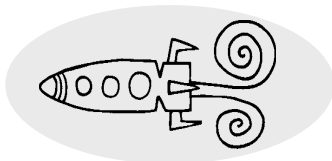
The captain asks for the emergency sirens to be turned off and a meeting is called to take place in 1 minute. All senior staff are to attend.

Immediate Action:

What your Class Should do:

The captain (*teacher*) asks each senior staff member (*selected students*) to take two or more crew members (*students*) to form a team to investigate the apparent sabotage.

Around the room are set up suggested things to 'check out' (see *Preparing the Evidence and Relevant Skills* section). The captain wants all teams to report back at a given time, (eg 2 lessons) and discuss their results.



Preliminary Preparation for the Teacher:

With this activity, the class becomes the crew that is investigating the crime. This means that at least one of them must have committed the crime.

One student (crew member) will be selected secretly, or volunteer anonymously, to be the 'saboteur' and to provide the evidence that will incriminate them. They may have a lot of fun being in on the secret.

Certain characteristics can be designated to other crew members. For example, every crew member is issued with a standard issue pen and wears the same uniform. However, some crew members may have additional fountain pens or odd clothing to remind them of home and so on, which makes it easier to find out who may have written the note or left unusual fibres at the scene of the crime.

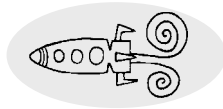


LEARNING
MODULES

SABOTAGE ON THE STARSHIP FORENSIC

Preparing the Evidence:

The following evidence needs to be prepared by the teacher before conclusions can be drawn from the Suggested Relevant Skills on the next page.



Fingerprints

Place three fingerprints on the surface of some of the items found in the engineering tunnel - one belongs to the 'saboteur' and the other two belong to innocent crew members. You will need samples from each crew member for comparison (*see Dossier module*) with these three fingerprints.

Hair Strands

Collect one strand of hair from the 'saboteur' and one from an innocent crew member.

Cloth Fibres

Collect one cloth fibre that is the same as the standard issue uniform and two other fibres from different sources. You will need to compare samples such as pieces from a standard issue uniform and at least 5 other samples of non-standard clothing found on the ship eg. school uniform fibres vs regular clothing.

'Explosive' Material

Provide one large, flattened piece of plasticine, poster putty or similar material, in which the 'saboteur's' footprint has been left.

Tape Matching

Collect tape dispensers from around the school. The more damaged or unique they are, the better. Make sure that at least one of them has a distinctive tear off/zig zag pattern. Label the dispensers with some of the crew members' names. Use the tape from one of the dispensers that has a distinctive tear off pattern, to seal the extortion note. This dispenser should be labelled with the saboteur's name.

Pen Matching

Select at least four black, different brand, water-based felt pens. Label one of them as standard issue and the remainder with a crew member's name. To add to the intrigue, the note should be written using the standard issue pen.

Alibis

Prepare stories for some of the crew members and the saboteur, so that if they are interviewed they will have information to add.

Extortion Note:

Get the 'saboteur' to write the extortion note (*as in the Storyline*), tear it out of a writing pad (*so that there is a distinctive tear at the top of the page*) and then ask the 'saboteur' to seal the note in an envelope with sticky tape. (*You may want to get them to leave their fingerprint on the note or tape as an extra piece of evidence*).

Paper Tears

See Extortion Note above. Provide a variety of writing pads, some with tears at the top of the page and some without and include the writing pad from which the extortion note was written. Label each writing pad with a crew member's name. You may wish to have the note written on an innocent crew member's writing pad so that the case is not clear cut. If you think your class will need more direct leads, label the writing pad with the saboteur's name.

Stolen Chip

Supply the saboteur with a mock up of a stolen computer chip.



LEARNING
MODULES



**Before attempting to solve the crime,
the crew's forensic profiles should be collected
by completing the Dossier (see page 6).**

SABOTAGE ON THE STARSHIP FORENSIC

Suggested Relevant Skills

Below are suggested activities that the students can use to solve the crime. You will need to adapt the skills used in these activities to the Space Sabotage scenario.

It is strongly recommended that the class develop their forensic skills first through the Dossier module at the front of the book. Their Dossiers will act as a good database for finding the saboteur.

Choose from below the skills that you would like your class to use to solve the crime.

- Fingerprints have been found at the scene of the crime. To whom do they belong? Activities 4 or 5 (*depending on the material on which the fingerprints have been left*)
- Two different types of hair were found at the crime scene. One was stuck under the plastic explosive left on the floor and one was found on the floor amongst the broken glass. To whom could they belong? Select from activities 13, 14, 15 and 16
- Three cloth fibres were found. Do they come from standard issue uniforms or do they come from some other form of clothing? Select from activities 13, 14, 15, and 11.
- Footprints were found on some left over plastic explosives on the floor. Cast a mould and match the print with those in the Dossier. Adapt Activity 1
- Match the tape used to seal the envelope containing the extortion note with other tapes on the ship. From whose dispenser did the tape come? (*As a bonus, there could also be a fingerprint found on the tape!*) Activity 12.
- Did the ink on the extortion note come from a standard issue pen or from some other type of pen? Activity 3
- Whose writing style matches that found on the extortion note? Activity 2
- What happened before, during and after the power cut? (*To add dramatics, the clock in the emergency box could appear to have stopped when the box was smashed open*). Collect alibis from crew members and construct a time line of events. (*Not found in Activity session*)
- Match the ripped edge of the paper on the extortion note with those found in crewmembers' rooms. Select from activities 10, 13, 14, and 15.



LEARNING
MODULES

Discussions and Conclusions

On completion of the activities (left), teams should meet back at the designated time and discuss likely suspects, eliminating some using proper scientific procedure. If the teams collaborate correctly, the culprit(s) should be found and hopefully so too will the stolen chip!

Extension Activities

Make-Believe Tests

Develop some make-believe tests that you could do on a spaceship to obtain further information. For example, include analysis of the electric field, vibrations, pheromones left behind by crew members that have been transported (*beamed*) down or have left the crime scene.

Mock Trial

Set up a mock trial and establish what to do with the guilty party if someone is convicted.

Be a Journalist

Pretend to be a journalist. Report on the crime as you see it in a typical news style.

What Would You Write Home?

E-mail home to your family and friends and tell them what's happened, without giving away any confidential or vital information.



Cross-curricular Benefits

These activities promote co-operation, observation, discussions, writing skills, stimulus for future stories, role-playing and best of all, some good investigative skills.

SCENARIO 4

CRASH!

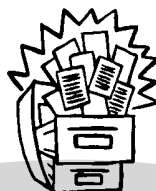
What To Do:

Read the investigating Officer's report below. Use the map and the statements from the witnesses to find out what you think happened to the school bus and why. The suggested activities on page 24 may help to solve the mystery of the school bus crash.

**The Investigating Officer's Report**

I was called to the school by the registrar at 5:57 pm on the day of the accident. When I arrived, the Principal, the registrar, the sports teacher, the cleaner, a neighbour, and a local high school student were present. I took statements from them all, and tried to get definite times from them, but the clock in the office was 5 minutes slow, and the others could only give estimates. It appears that there were two other boys near to the scene, but I haven't yet been able to interview them.

It is a puzzling case. There is no clear evidence which implicates any one person. There is some conflicting evidence about the whereabouts of some suspects. The scene was pretty confusing, with the steam billowing from the bus, the sun just about down, and people everywhere.

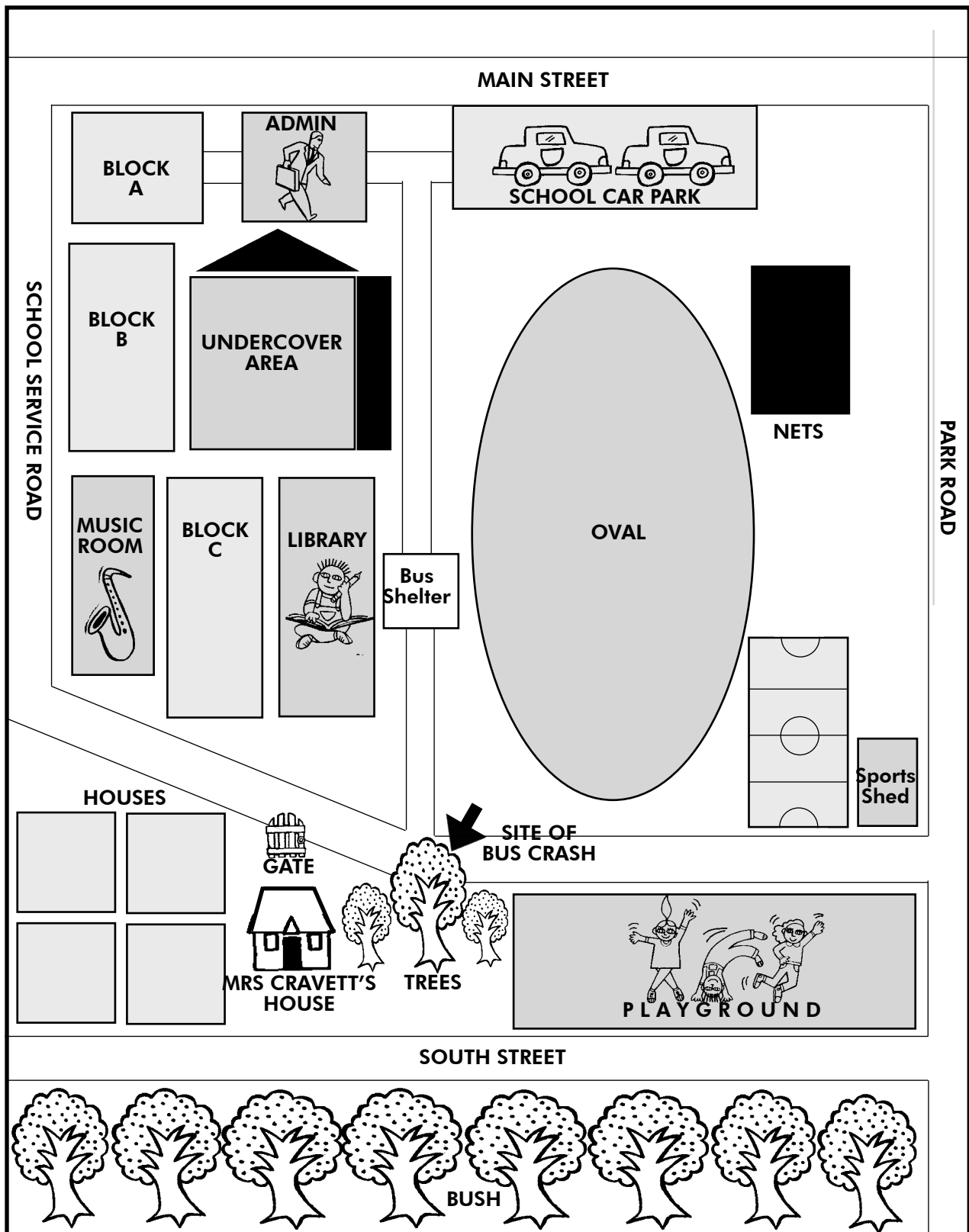


The files on this case will remain open until we obtain more information.

LEARNING
MODULES

CRASH!

JEWEL CREEK SCHOOL



CRASH!**Neighbour****Mrs Cravetts' Statement**

My name is Mrs Cravetts and I live in a house that backs onto the school grounds. I don't mind living near the school as most of the time it's not too noisy, except for when they start up that dreadful old bus! It makes the worst racket when they start it up and it belches out clouds of filthy smoke. It really makes my washing smell awful. I wish they'd got rid of it years ago. I've been on to them to buy a new one or at least a better one, but that Principal is too stingy.

5.15pm I went out to bring the clothes off the line before dark. I folded the clothes as I took them off the line. My son and his friend were out playing in the yard.

5.25pm About 10 minutes later, I heard the sound of breaking glass. I looked over the fence and saw a couple of boys running off across the oval. The sports teacher always runs a cricket practice session after school so I figured that they would tell him what had happened. I didn't see or hear anything further, so I finished folding my washing and took it inside, leaving the boys still playing.

5.30pm I went outside again, to water the garden. The boys were no longer in the yard so I assumed they had gone across to the oval to play, although it was getting a bit dark for them to be out and about.

5.40pm I'd only been outside for about five minutes when I heard the sound of that awful smelly school bus starting up. Whoever was starting it was having trouble as usual because it coughed and spluttered and poured out clouds of smoke. Just as well I'd taken my washing in!

I went on watering, keeping an eye out for my son and his mate. I saw someone come around the corner of the school building and light a cigarette. It looked as if they were wearing something red.

All of sudden I heard a huge crash in the school yard. It sounded quite close, so I opened the back gate and began to walk up to the school. As I got nearer to the big tree I could see smoke or steam or something coming from a vehicle under the tree. It looked like the school bus. I could see my son and his friend running towards me. Then I saw the Principal, the cleaner and the school registrar all racing down the road towards the tree. It looked as if the school bus had crashed into the tree. I hope nobody was hurt!



LEARNING
MODULES



CRASH!



Principal

Mr Skinner's Statement

My name is Max Skinner and I am the principal of Jewel Creek School. I don't know who would have wanted to wreck our bus. It's really hard trying to keep all of the staff in this school satisfied. They all want more funds for their favourite projects, and I have to try to balance the books, keep the parents happy and provide a good education for the students. I am under a lot of pressure.

- 3.45pm** On Tuesday 28 October I was at school doing my usual duties until 3.45pm . I then went to the music room to oversee drama rehearsals for the school play. It was pretty noisy in there with students practising the main musical piece.
- 5.30pm** No one left the music room until about 5.30pm when I locked up and dismissed the students. After locking up I walked to the administration block. On the way I saw the cleaner and said goodbye, as it was her last night working for the school. I noticed that she ignored me and seemed quite upset. Unfortunately, I had to retrench her cleaning services in favour of a private company.
- 5.35pm** When I reached the administration block I saw the registrar disappearing down the corridor and called out to her that I was going to take the keys for the bus as it needed filling before the excursion the next day. I suppose that would have been about 5.35pm. After picking up the keys from my desk drawer I walked down to the bus. I noticed it wasn't locked but figured it could have been left open by the sports teacher who had used it earlier in the day.
- 5.40pm** I started the bus up and suddenly realised that I had left the diesel charge card in the office. I decided to leave the bus running (*as it takes a good 5 minutes to warm up a diesel engine*) and ran back to get the card. I'm sure I put the handbrake on.
- 5.45pm** I ran back to the office and noticed that it was getting late, about 5.45pm by the clock on the wall. I called out for the registrar to see if she knew where the card was but there was no answer. It was then that I heard the crash.

I assumed the worst and ran down to the bus only to see it mangled up against a tree with the sports teacher peering inside. At the same time I saw the registrar appear at the crash site with the cleaner. Then I noticed the old busy body from the house behind the school moving quickly towards the bus. We all looked at the bus and saw that not only was the front all smashed in by the impact, but a side window had also been broken. I remember wondering who would have done this to our bus and why?

LEARNING
MODULES

CRASH!



School Registrar Ms Countem's Statement

I have been the School Registrar for eight years. The past four have been the worst, since Mr Skinner became the Principal. We have been in continuous debt because of his bad management of finances. His latest "great" idea was to hire a new cleaning company that will cost a fortune - much more than poor Ms Dustin who could do with the job! It really worries me that when the School Board finds out how bad the financial situation is, they will blame it all on me.

4.30pm I'd had a very busy day with kids running everywhere getting ready for camp tomorrow and parents paying fees and I hadn't had a chance to finish printing off the end of term reports that are due at the end of the week. So, I decided to stay back and finish the printing of the reports.

I finally got started about 4.30 pm when all the kids had gone. The only kids left were those doing cricket training on the oval with Mr Catchem. Really, I couldn't hear much if I tried, because the printer was going most of the time - it's really noisy, and I had over 200 reports to print out.

5.30pm I did see Dan McGraw go by on his roller blades a bit before 5.30 pm. He was going really fast. He probably came along the School Service Road. That's where he seemed to come from anyway, as he went in front of the administration building along Main St from the West side of the school. I noticed him because he was going so fast, without looking where he was going, so that a car squealed its brakes to avoid hitting him. Silly boy!

It was about the time that I saw Dan go past that I had to go to the toilet. I hadn't had the chance to go since lunchtime! I guess I got back to the office at about quarter to six. It must have been about then because at 5.48 pm exactly - I checked my watch. I heard an awful bang and the breaking of glass. It was just terrible. My first thought was that there must have been a car accident around the back of the school - it was so noisy! I raced around the back of the school to find the bus smashed into the tree!

Poor Mr Skinner, he's the school Principal, was so upset. He'd only left the bus for a few minutes to come and get the diesel charge card from the administration building. I thought he was going to break down but he didn't - he's pretty sensitive you know.

It's great that no one was hurt and it's not so bad that the bus was wrecked. It was pretty broken down you know - with a bit of luck we'll be able to get a new one now with the insurance money. See - every cloud has a silver lining!



LEARNING
MODULES



CRASH!

Cleaner

Ms Dustin's Statement

I have been a cleaner at the school for about 4 years. With all the budget cutbacks, I have been sacked. 'Made redundant' they call it, but it doesn't matter what they call it, I'm out of a job. And all because of that business last year when some money went missing from the office! They tried to blame it on me, but of course they couldn't prove anything. Good riddance, I say. Blow their stupid bus and their stupid school! Let them suffer a bit.

- 5.15pm** I was vacuuming the library, just finishing off before knock-off time. The vacuum cleaner is an industrial one, and it makes a lot of noise. I couldn't hear anything other than the vacuum cleaner.
- 5.30pm** It was exactly 5:30 pm when I turned off the vacuum cleaner - I know because I never knock off early, not like some people I could mention! I put the cleaning gear back in the store room, locked it, and went to the administration block to return my keys. I wanted to make sure no-one could accuse me of nicking off with them, like they've accused me of other things in the past. On the way, I saw the Principal locking the music room but I put my head down and pretended not to see him. I guess I was still a bit angry at losing my cleaning job. I couldn't find the registrar in the office, although the computer was still on, so obviously someone was still working. I didn't like to just leave the keys, so I waited around (for what seemed like ages) in the staff room next door.
- 5.48pm** I was just about to give up, and had walked out of the front entrance, when I heard an almighty crash come from the School Service Road beyond the oval. I rushed out the back and ran towards where I'd heard the noise. It was pretty dark by then, and people seemed to be coming from all directions.
- 5.50pm** I saw that the school bus had crashed into that big tree down near the fence. Steam was billowing from the bonnet. Lots of people were already there, stickybeaking. The Principal came up behind me and I took the opportunity to hand him the keys so I wouldn't forget later. He seemed breathless and flustered - I don't know where he had been! The sports teacher was close to the door of the bus peering around and, as usual, tossing a cricket ball from one hand to the other.



LEARNING
MODULES



CRASH!



Rollerblader

Dan "Wheels" McGraw's Statement

The teachers at the Jewel Creek school were always giving me a hard time when I was there. I never seemed to be able to do the right thing. What a boring place it was. Nothing exciting ever happened, and when I tried to liven things up, I got busted!

5.15pm I had decided to go roller blading at the Jewel Creek school as I had been suspended from my high school and I wasn't allowed on my own school grounds. At around 5:15 pm I decided to roller blade in the Undercover Area so I could be out of the wind.

5.25pm About 10 minutes later, when I was just rolling around and watching the kids training on the oval, one of the kids hit a ball for a six and it smashed right into the bus under the bus shelter. I heard breaking glass so I decided to clear off very quickly as there would be hordes of people coming to investigate. I scooted up the path that goes around 'B' Block to the School Service Road. I pelted up the road into Main Street and some stupid car nearly hit me! I decided not to go home but to go past the school, along Main Street, and around to Park Road. My friend lives on South Street and I could go down Park Road to get to him and I could see what was happening at the school at the same time.

5.50pm I 'bladed' down Park Road and found my friend who had his best school buddy with him. We decided we would hang out together for the rest of the evening. I would have liked to have been the kid who hit that ball for a six that smashed into the school bus. When we were hanging around, guess what? There were people everywhere. Something had happened to the old school bus. Wicked!



LEARNING
MODULES



CRASH!



The Cricket Coach

Mr Catchem's Statement

I have been a sports teacher at this school for 2 years, and I love my job. Most of my time is spent coaching teams and taking phys-ed lessons. I am usually the one who drives the bus when a team has to play away. It's a rattly old thing which never gets serviced properly because there isn't enough money in the school budget. I worry about the safety of the passengers sometimes, but I don't seem to be able to make the Principal understand the seriousness of the issue. All he ever goes on about is how the students are always wrecking things, and he never gives them any credit for the good things they do.

4.30pm When cricket practice started, there were too many students for the nets so I organised the extra students into two groups to practise their fielding and throwing on the oval. I needed to supervise the net sessions carefully for safety reasons, so I only glanced briefly at the other groups every now and again. They seemed to be on task, although there was a lot of laughing and joking going on. Well, kids should be allowed to have fun. They're always getting blamed for everything that happens around here, and no-one gives them any credit when they give up their time for the school teams.

5.25pm One of the fielding practice groups came running across to me and asked if they could leave as they had a lot of homework to do that night. I looked at them suspiciously because there were only 5 minutes to go, but they seemed genuinely anxious to get home. So I let them go. I was already starting to pack away the gear anyway.

5.30pm I called all the other cricketers in with their gear, and sent them home. I continued to pack away the equipment. One ball seemed to be missing, but in the fading light I wasn't going to search the oval for it - it could wait until tomorrow. The Principal would insist that it be found - the school was pretty short on funds, and I'd given up making requests for more sporting equipment.

5.48pm Just as I was about to leave, I heard a loud smashing noise. It sounded like a car accident. I ran towards the School Service Road and saw the school bus crumpled against a tree. It was a wreck! I raced towards it, thinking that my first aid skills might be needed if the driver was injured. But the bus was empty by the time I got there. There were a few objects scattered on the floor - a cigarette butt, broken glass, some lolly papers, and a lunch box, I think. It was hard to see because of the steam and the sun was almost down. A lot of people were milling around, but no-one seemed to know what had happened.

LEARNING
MODULES

See next page for suggested activities.



CRASH!

SUGGESTIONS FOR

**STUDENT
ACTIVITIES**

Select some of the activities below to help your class solve the bus crash mystery.

- Construct a time-line of the events of the day.
- Ask students to select one or more of the suspects and present a case for the prosecution proving that they were the culprit. Consider motive, opportunity, timing, evidence, and your instinct.
- Role play the scene.
- Have some students take the part of each of the suspects, and have the other students ask them questions to try to determine the guilty party. The suspects can collaborate beforehand to decide on their stories, and any extra information which they might divulge.
- Form a jury to consider the evidence with which they have been presented and arrive at a verdict.
- Write a possible solution to the mystery using the information provided by the characters, but also adding any other evidence which is not inconsistent.
- Produce some physical evidence which might help to solve the mystery, and go through the process of analysing it.
- Write media reports from the point of view of each suspect.
- Interview the suspects on audio or video tape, and check for inconsistencies.
- Draw a picture or create a cartoon depicting the incident.
- Conduct a class vote on the most likely culprit.
- Students become journalists reporting on the case, presenting all the known evidence and interviewing witnesses. Make a video of the reports.
- Write the story from the two boys' point of view. What did they see? What did they do?
- Debate topics centred around the need for a new school bus, or the presentation in the media of negative images of youth.
- Draw a map of your school, and construct a story about a similar incident which might happen. Give details of any forensic testing which would be involved.



LEARNING
MODULES

SKILL-BASED ACTIVITIES

This section focuses on a variety of forensic skills, set within student friendly activities.

LEVELS OF DIFFICULTY

The number of magnifying glasses shown below, signifies the level of difficulty of each of the activities.



Difficult




















Moderate



Easy

Note: Teachers are advised to select, plan and supervise activities with the safety of their students in mind

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ACTIVITY 1

MAKING A PLASTER CAST OF A SHOE PRINT

Curriculum Framework Learning Area Outcome

Acting Responsibly

Key understanding(s) that opportunities are being provided for:

- Students make decisions that include ethical considerations. In particular, the students understand the importance of considering the accuracy and validity of data.

Natural and Processed Materials

Key understanding(s) that opportunities are being provided for:

- Students can describe the interactions between, and changes to materials. In particular, that adding water to Plaster of Paris is an example of a chemical reaction.

What You Need:

- Plaster of Paris
- Stick (for stirring)
- Damp sand
- A strip of thin cardboard (10cm wide)
- A large tray
- Plastic container
- Vaseline
- A shoe with a well defined sole
- Half a bucket of water for excess plaster



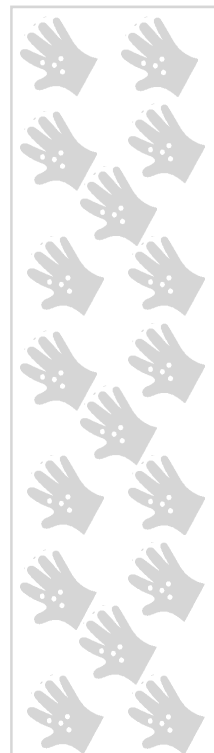
Background Information:

When water is added to Plaster of Paris, which is a form of gypsum (*calcium sulphate*), a chemical reaction takes place and heat is given off. This reaction also results in a slight increase in volume, which forces the Plaster of Paris into even the smallest of cracks and crevices. The plaster sets very quickly once water is added and needs to be used immediately. Care also needs to be taken with the disposal of unused plaster. It should be wrapped in paper and placed in a rubbish bin - do not attempt to wash left-over Plaster of Paris down a drain as it may set in the pipes and cause a blockage.

What You Do:

- Fill the tray with damp sand and smooth the surface to make it level.
- Press the shoe firmly down onto the damp sand so that a clear impression is left. (*Smooth out the sand and try again if the print is not sufficiently clear*).
- Surround the impression with a cardboard collar by taping the ends of the cardboard strip together and pressing the collar into the sand to hold it into place. (*A thin smear of Vaseline on the inside surface will aid removal from the dried cast*).
- Place a quantity of Plaster of Paris into a disposable container and add sufficient water to make a thick paste. Use the stick to quickly stir the mixture. (Do not add the water until you are ready to use the plaster as it sets quite fast and the more you stir, the faster it sets.)
- Pour plaster of Paris into the imprint. Gently jiggle the tray to level the Plaster of Paris and ensure that it fills the impression. Pour excess plaster into bucket of water.
- Leave to dry undisturbed for one to two days.
- Lift the cast out of the sand, tear off the cardboard collar and wash or brush off the excess sand.
- Compare the print with the original shoe and observe similarities and differences. Is your cast of a shoe print sufficiently accurate to be used as evidence?

* For those using this in senario 3, you will need to carefully place the 'explosive' into a sandbox tin and use it as your footprint.



SKILL-BASED
ACTIVITIES



ACTIVITY 2

ANALYSING HANDWRITING

Curriculum Framework Learning Area Outcome

Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world using reflection and analysis to process and interpret data. In particular, students process data by searching for patterns in results and by constructing explanations.

Background Information:

A hand written note may become evidence in some crimes, particularly in cases of forgery. A person's handwriting contains many individual characteristics and is reasonably unique. A number of techniques can be used to analyse and compare the characteristics of handwriting samples or to determine whether a signature is genuine. Some of these characteristics are as follows:

- Size** - Height and width of letters: Analyse height and width of letters by ruling a pencil line across the top and base of the line of writing, to determine uniformity.
- Slope** - Rule a line through each letter in the same direction as the slant of individual letters.
- Spacing** - Cover the line of writing with a piece of tracing paper and draw lines between the end of each letter and the start of the next letter to indicate gap size.
- Pressure** - Examine the back of the page of writing, looking for a light, medium or heavy pressure and whether or not the pressure is uniform or variable. This can be more easily seen by examining the back of the page of writing.
- Printed or written** - Has the author chosen to write or print their message or have they used a combination of writing forms?
- Special characteristics** - Examine the overall style including any unusual features such as formation of word endings or the placement of the dot on the 'i'.

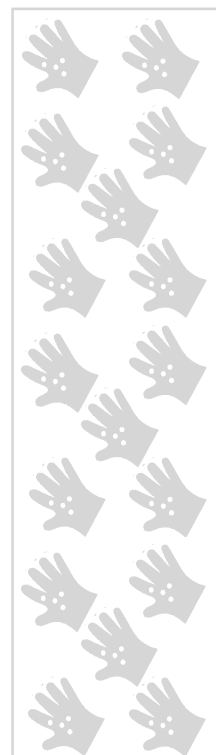
What You Need:

- Tracing paper
- Three different samples of handwriting. (*You will need at least a paragraph or so of each writing style to facilitate analysis.*)
- Ruler
- Paper clips
- Blank paper/clean pages



What You Do:

- Use a paper clip to attach each handwriting sample to the top of a clean page.
- Analyse each sample in turn on the basis of the following characteristics:
 - size
 - slope
 - spacing
 - pressure
 - printed or written
 - special characteristics
 - overall neatness
 - use of capitals
- On a clean page write a brief description about each characteristic for each handwriting sample.
- Number each page and the back of each matching handwriting sample, with the same number. Separate them and swap with another student. Challenge them to match each analytical description to the correct handwriting sample. (*Check by matching the page number to the number on the back of each sample.*)

SKILL-BASED
ACTIVITIES



ACTIVITY 3

CHROMATOGRAPHY

Curriculum Framework Learning Area Outcome

Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world using reflection and analysis to process and interpret data. In particular, students process data by searching for patterns in results and by constructing explanations.

Natural and Processed Materials

Key understanding(s) that opportunities are being provided for:

- Students understand that different materials have different properties.

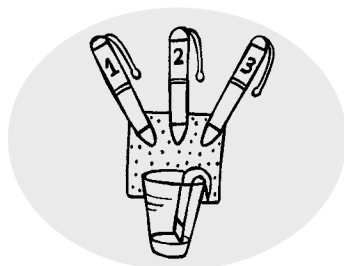
Background Information:

Chemists use the process of chromatography to identify unknown substances, by separating the components that make up the substance. In paper chromatography the substance to be identified is applied to a strip of absorbent paper (filter paper, blotting paper or paper towel) and then suspended in a solute such as water, acetone or methylated spirits. As the solute moves upward through the paper strip, the substance dissolves and is carried along in its path. Each pigment has a different particle size, and the lightest particles travel faster and further.

In this activity the dyes will spread through the strips to form different patterns of colour. The pattern on one of the numbered strips will match that of the unnumbered strip from the crime scene, enabling the identification of the pen used to write the note.

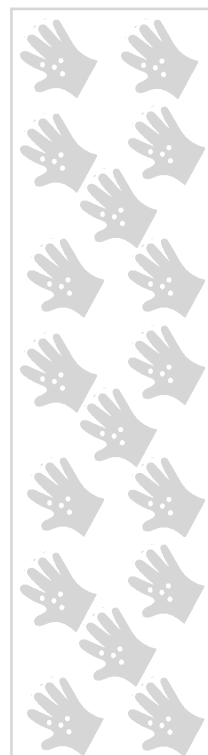
What You Need:

- Three different brands of black ink pens (*water-soluble inks*)
- A sample note written using one of the black pens
- Strips of blotting paper or white paper towel
- Clear plastic cups
- Scissors
- Water



What You Do:

- Number the pens 1-3.
- Select pen one and draw a horizontal, thick line 3cm up from the bottom of a blotting paper strip. Use the same pen to write the number of the pen (1, 2 or 3) at the top of the strip.
- Repeat this procedure using pens 2 and 3, on separate strips.
- Place 1cm of water in a clear plastic cup and stand each strip in the cup so that the water just touches the bottom of the strip. Do not allow the ink line to go into the water. Bend the top of each strip over the side of the cup to hold it in place.
- Cut a similar-sized strip of paper from the sample note and place it in a separate cup. Place sufficient water in the cup to ensure that the water touches the bottom of the strip.
- Leave the strips in place until the water has travelled at least halfway up each strip.
- Remove the strips and place them on a piece of paper towel to dry.
- Compare the three numbered strips with the strip from the sample note and see if you can determine which pen was used to write the note.

SKILL-BASED
ACTIVITIES

This activity can be repeated with permanent marker pens using methylated spirits as the solvent. Remember to work in a well-ventilated area and take appropriate safety precautions.



ACTIVITY 4

FINGERPRINTING

Curriculum Framework Learning Area Outcome
Investigating

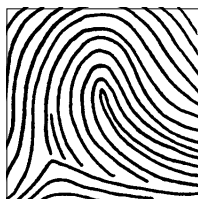
Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world using reflection and analysis to process and interpret data. In particular, students process data by searching for patterns in results and by constructing explanations.

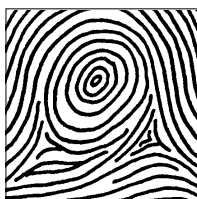
Background Information:

The patterns of tiny ridges that can be seen on the pad of each fingertip are known as fingerprints. They form on a human embryo during the fourth and fifth month of development and do not change throughout an individual's life. Fingerprints are unique to an individual and even identical twins do not have fingerprints that are exactly the same. Fingerprinting has now been recognised as an important source of forensic evidence in the solving of crimes.

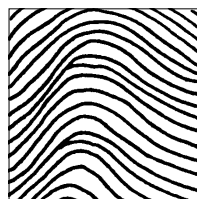
Most human fingerprints can be grouped into four main categories:



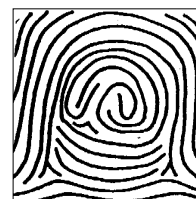
1. Loop - the lines that form the ridges enter and leave from the same side of the fingertip pad.



2. Arch - the ridge lines enter from one side and leave from the other.



3. Whorl - the ridge lines enter from one side and spiral inwards to the centre.



4. Composite - this type of print is a combination of 1 - 3 so may present as a combined whorl and arch, or a loop that ends as an arch.

Each of these groupings also has more specific sub-groupings.

What You Need:

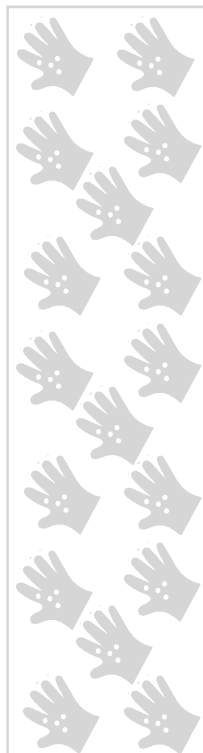
- Stamp pad (*blue or black ink*)
- Soap and towel
- Magnifying glass
- Scrap paper



What You Do:

1. Fold a clean sheet of paper in half and label the top half 'Left Hand' and the bottom half 'Right Hand', or use the Dossier from this book.
2. To take your own fingerprints roll the pad of your finger from left to right across the stamp pad. Transfer the print to paper by rolling your finger from left to right on your page.
3. Use scrap paper to make some practice prints first to ensure that your prints are clear.
4. Begin with your left thumb and print each finger on your left hand placing the prints in order across the prepared page.
5. Repeat the procedure with your right hand.
6. Clean your hands with soap and water.
7. Label each finger print eg. thumb, index finger, middle finger, ring finger and little finger.
8. Classify your prints with the aid of a magnifying glass and record your results.

** Ensure that students are using the pad of their fingers rather than the tips to take prints.*



SKILL-BASED
ACTIVITIES

Extension:

Collate the results of a group or whole class and try to determine which type of fingerprint pattern is the most common and which is least common.



ACTIVITY 5

FINGERPRINTS FROM NON-POROUS SURFACES

Curriculum Framework Learning Area Outcome Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world. In particular, students conduct investigations by using simple materials and equipment to observe or explore phenomena of characteristics of organisms.

LATENT FINGERPRINTS

Background Information:

We leave fingerprints on any object that we touch because of the oil on our skin. Many of these are not readily visible to the naked eye and need to be treated in some way to increase their visibility. Prints such as these are known as latent prints.

What You Need:

- Graphite powder
- Fine paint brush
- Smooth shiny surface
(white china plate or a glass)
- Wide clear sticky tape

What You Do:

- Press the thumb and fingers of one hand onto the plate or glass.
- Sprinkle a small amount of graphite onto this area.
- Shake off the excess powder and then use the paintbrush to gently brush off any remaining powder.
- Place a piece of sticky tape over each print. The dusted fingerprints will adhere to the tape, which can be lifted off the object and stuck onto a clean sheet of paper.

**Fingerprints on dark objects can be highlighted with talcum powder.*



SKILL-BASED
ACTIVITIES





ACTIVITY 6

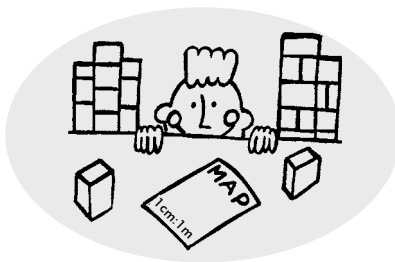
MAP READING

Curriculum Framework Learning Area Outcome

Mathematics - Space

Key understanding(s) that opportunities are being provided for:

- Students visualise, draw and/or model locations.



ACTIVITY A

What You Need:

- Block shaped toys (*Lego, cars*)
- OR
- A table setting
- Paper, pencil, ruler

What You Do:

- Set out your toys or table setting on a bench or table
- Look at them from the side.
- Look at them from higher up.
- Now look at them from directly above.
- Draw a map of what you see from directly above.

ACTIVITY B

What You Need:

- A real or imaginary scene (*classroom, bedroom, school ground, playground, favourite place, treasure island*)
- Paper, pencil, compass, ruler.

What You Do:

- Imagine what your scene would look like if you flew directly above it.
- Draw your scene from above to make a map.
- Use your compass to work out where North is and draw it on your map.

ACTIVITY C

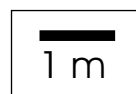
What You Need:

As for previous activity

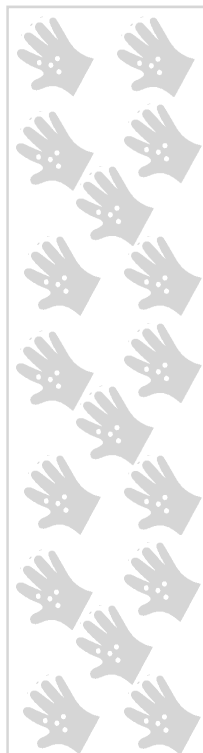
What You Do:

- Draw your map to scale eg.
1 centimetre of your scene = 1 metre on your map.
- Draw a key to show the scale

eg. 1 cm = 1 m.



- Draw grid references on your map and ask your friends to find things on your map by using the grid.



SKILL-BASED
ACTIVITIES



ACTIVITY 7

SEQUENCING EVENTS

Curriculum Framework Learning Area Outcome English - Writing

Key understanding(s) that opportunities are being provided for:

- Students experiment with forms of writing.

What You Need:

A story sequence as shown below

I waved goodbye to my friends at school.

I rode my bike past the newsagents and the butchers.

There was a nice snack waiting for me at home - my favourite banana pie!

After I'd finished my homework I played with my friend until I was called into dinner.

I walked to the bike rack and undid the padlock on my bike.

I got home and put my bike in the garage.

I ate my snack, had a drink of milk and started doing my home-work.

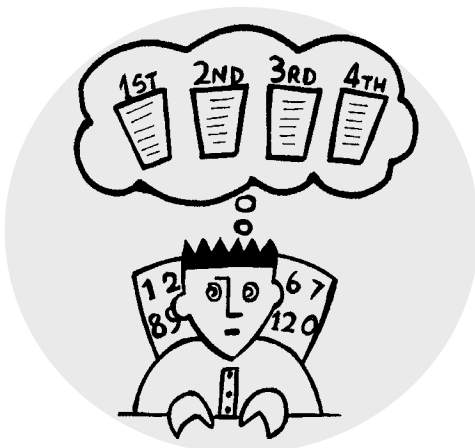
For dinner I had my not-so favourite meal - boiled fish eyes and roasted cabbage, only kidding!



SKILL-BASED
ACTIVITIES

What You Do:

- Copy the above statements and cut into sections to form a series of cards.
- Shuffle the cards to alter the sequence and challenge students to complete the story by correctly sequencing the cards.
- Challenge students to make their own sequencing cards by first writing a story and then breaking it up into segments.





ACTIVITY 8

SOIL ANALYSIS

Curriculum Framework Learning Area Outcome
Science in Daily Life

Key understanding(s) that opportunities are being provided for:

- Students select and apply scientific understandings across a range of contexts in daily life. In particular, students recognise when scientific knowledge can be used to explain and predict events in their daily lives.

Natural and Processed Materials

Key understanding(s) that opportunities are being provided for:

- Students understand that different materials have different properties and they can describe those properties.

Background Information:

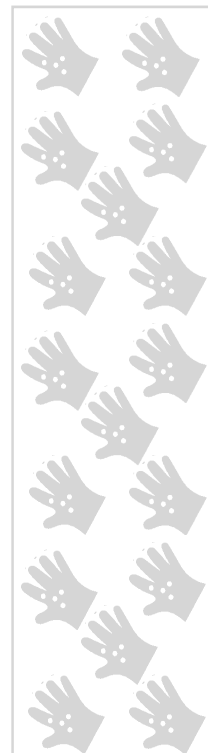
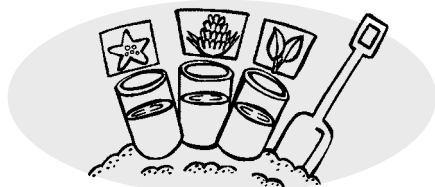
The examination and analysis of soil, dirt and dust particles can provide important information that can be used as evidence in the solving of crimes. Soil particles come in a range of sizes and these determine whether the soil is sand, silt or clay. To determine soil type, dampen a small amount of soil and rub it between your fingers. Sand will feel gritty and individual grains will be easy to see. Silt will feel rough and may leave a slight smear on your skin while clay will feel smooth and will leave a continuous smear on your fingers. Soil also contains water, air, organisms, decaying plant and animal matter and pieces of rock. Information about these components, plus the colour, particle size, and acidity of soil can provide evidence about the possible location of a crime when comparing soil from a victim's shoe or car tyres with samples from various places.

What You Do:

1. Working with one soil sample at a time, place a small amount of soil onto a sheet of white paper and spread it out thinly.
2. Examine the sample with the naked eye. Then with the aid of a magnifying glass, attempt to identify the components that make up the soil sample.
3. Record the type of soil particle most predominate (*sand, silt or clay*) and any other components that you can recognise, such as pieces of grass, fragments of shell, beetle casings, or similar. Also include details of colour, odour and moisture content.
4. Repeat this procedure with the other soil samples, recording your observations.
5. Place a small amount of each soil in a separate jar, half-fill each jar with water, secure the lid in place and shake for a few seconds. Label the jars.
6. Observe each jar closely to see how long it takes for the soil particles to settle. Sand particles will settle very quickly. Silt particles will take longer to settle but eventually the water will clear. Clay particles will stay in solution for much longer because of their fine size, giving the water a cloudy appearance.
7. Take off the lids and observe the material that has floated to the top of the jar. This may give some indication of the likely source of the soil.

What You Need:

- Three soil samples from different locations (*eg beach, pine forest, and suburban garden*)
- Magnifying glass
- Three clear containers with water-tight lids

SKILL-BASED
ACTIVITIES



ACTIVITY 9

DETERMINING THE pH OF SOILS

Curriculum Framework Learning Area Outcome Science in Daily Life

Key understanding(s) that opportunities are being provided for:

- Students understand the interactions between materials. In particular, they understand the characteristics of acids and bases and the use of the pH scale to identify the strengths of acids and bases.

Background Information:

The acidity of a substance is often called the pH. A pH of 7 is neutral, less than 7 is acidic, while anything greater than 7 is alkaline. The pH scale ranges from 0-14.

What You Need:

- 2 - 3 samples of soils from different locations
- pH test kit (*from chemists, pool shops, garden centres*)
- Clear glass jar with a water-tight lid
- Distilled water

What You Do:

- Select one soil sample and place 1/4 cup of soil and 1/4 cup of distilled water in the jar and shake well.
- Let the mixture settle and then dip a pH test strip into the liquid.
- Remove the strip and wait 30 seconds.
- Compare the strip with a pH colour chart (*supplied with the pH kit*).



SKILL-BASED
ACTIVITIES





ACTIVITY 10

TORN PAPER MATCHING

Curriculum Framework Learning Area Outcome
Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world using reflection and analysis to process and interpret data. In particular, students process data by searching for patterns in results and by constructing solutions.

Natural and Processed Materials

Key understanding(s) that opportunities are being provided for:

- Students understand that different materials have different properties.

Background Information:

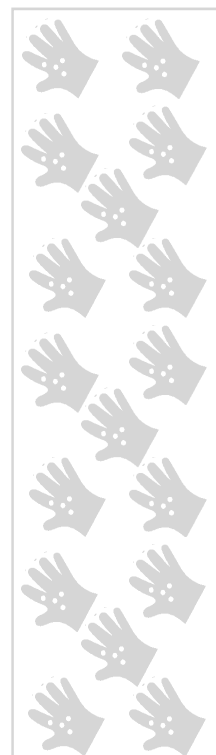
Paper is made up of fibres from natural plant materials such as wood pulp, grasses (*papyrus*), bark and cotton. Different types and qualities of paper have different fibre lengths and this can be seen when paper is torn rather than cut.

What You Need:

- Small samples of three different types of paper (*all similar in colour*)
- Magnifying glass
- Microscope
- Glass slides

What You Do:

1. Tear one paper sample in half and place both halves on a glass slide with the torn edges close together but not overlapping.
2. Examine with the magnifying glass and then cover with a second glass slide and examine through the microscope. Look closely at the torn edges. Are they rough or smooth? Can you see how the two pieces fit together? Are the fibres long or short?
3. Repeat with the other two paper samples.
4. Place all the torn pieces on one glass slide and then use your magnifying glass and/or microscope to match the pieces together.

SKILL-BASED
ACTIVITIES



ACTIVITY 11

FIBRE MATCHING

**Curriculum Framework Learning Area Outcome
Investigating**

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world using reflection and analysis to process and interpret data. In particular, students process data by searching for patterns in results and by constructing solutions.

Natural and Processed Materials

Key understanding(s) that opportunities are being provided for:

- Students understand that different materials have different properties.

Background Information:

Fabrics are made up of woven fibres that are either natural or processed. Some fabrics are a combination of different fibres. Each type of fibre can be identified by such characteristics as structure, strength, elasticity and reaction to heat. Microscopic analysis of fibres can aid in identifying their source and can provide valuable corroborating evidence in the solving of crimes.

What You Need:

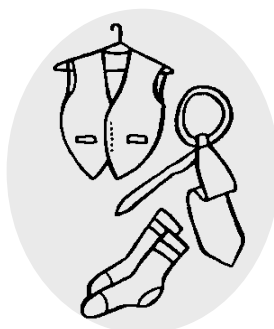
- A variety of fabric samples of different types (*similar in colour*)
- A few fibres from one of the fabrics, in a clear plastic bag
- Magnifying glass, Microscope
- Glass slides

What You Do:

- Remove the mystery fibres from the bag and place longways across a glass slide. Place a second glass slide on top to hold the fibres in place.
- Examine the fibres, first with a magnifying glass and then with the aid of a microscope.
- Record your observations about the appearance of the fibres and include comments about colour, structure, size, overall appearance and any unusual characteristics.
- Carefully tease a few fibres from one of the sample fabrics, and sandwich them between two fresh glass slides.
- Use the magnifying glass and microscope to examine and compare these fibres with the mystery fibres. Record your observations under the same headings as before.
- Continue to examine fibres from each of the sample fabrics in turn until one is found that matches the mystery fibres.

Extension:

To double check the accuracy of fibre identification, both sets of fibres can be tested for their reaction to heat. Carry out a 'flame test' by carefully holding a fibre in long-handled metal tongs over a naked flame (*Bunsen burner or a candle in a jar*). Remove from the flame and observe and record the colour of the flame from the fibre (*if applicable*), the length of time the fibre burns, the colour of smoke produced and the final colour and structure of the burnt fibre. Most natural fibres will form an ash when burnt and in some fibres, the ash will retain the original shape of the fibre while others will crumble. Most processed fibres will melt instead of forming ash and the residue forms a tacky lump. Repeat the process with the matched fibre and compare the results.



SKILL-BASED
ACTIVITIES



ACTIVITY 12

TAPE MATCHING

Curriculum Framework Learning Area Outcome Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world using reflection and analysis to process and interpret data. In particular, students process data by searching for patterns in results and by constructing solutions.

Natural and Processed Materials

Key understanding(s) that opportunities are being provided for:

- Students understand that different materials have different properties.

Background Information:

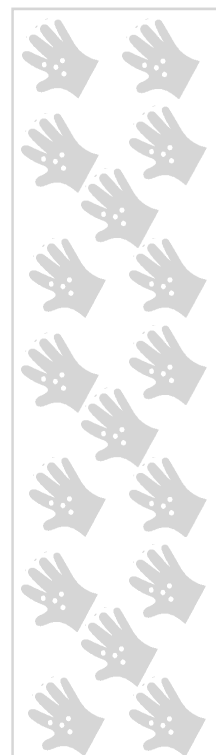
The cutting blades on tape dispensers often show considerable variations due to wear and tear over a period of time. Sometimes the teeth get bent or are broken off altogether. When a piece of tape is taken from the dispenser the cut edge of the tape can be examined and matched with the dispenser blade. The rolls of tape used in dispensers also vary in width, colour and density.

What You Need:

- Several different tape dispensers containing a range of different types of tape.
- Magnifying glass, Microscope, Glass slide
- Prepare one mystery tape slide by selecting a piece of tape from a dispenser with a damaged blade. Stick the tape to a glass slide so that the cut ends are clearly visible.

What You Do:

- Examine the mystery tape with the aid of the magnifying glass and then the microscope.
- Draw a sketch of the serrated end of the tape paying particular attention to the number and shape of the serrations.
- Select a tape dispenser, tear off a small piece of tape and stick it onto a clean glass slide.
- Examine the tape with the magnifying glass and then the microscope and draw a sketch to show the serration pattern.
- Compare this pattern with that of the mystery tape.
- Repeat this procedure with each of the tape dispensers until the mystery tape dispenser has been identified.



SKILL-BASED
ACTIVITIES



ACTIVITY 13

USING A MAGNIFYING GLASS

Curriculum Framework Learning Area Outcome Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world. In particular, students conduct investigations by knowing how to manipulate equipment to give answers to questions.

What You Do:

Magnifying glasses are available in different magnifications but most magnify objects about two to four times ($2-4\times$), which means that the object being viewed appears to be two to four times larger than actual size. To correctly use a magnifying glass, hold the lens just above the object being viewed and look downwards into the lens. Slowly raise the lens towards your eyes until the object comes into clear focus. (*Resist the temptation to hold the magnifying glass up to your eye.*)



ACTIVITY 14

VIEWING UNDER HIGH POWER

Curriculum Framework Learning Area Outcome Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world. In particular, students conduct investigations by knowing how to manipulate equipment to give answers to questions.

What You Do:

A parfocal microscope allows you to move from low power to a higher magnification without refocussing. However, you will need to follow these steps if your microscope is not parfocal:

- Using low power, look through the tube to make sure that the viewing object is in the centre of the field of view.
- Viewing from the side of the stage, turn the coarse adjustment wheel so that you raise the objective lens about 2cms above the slide.
- Turn the nosepiece until the required objective lens has clicked into position, in line with the body tube.
- Again viewing from the side, slowly turn the coarse adjustment wheel so as to lower the tube until it is just above, but not touching the slide.
- Looking into the eyepiece (*ocular lens*) gently turn the fine adjustment wheel until the object comes into focus. At high magnification this step needs to be done very slowly to avoid missing the plane of focus altogether.
- Adjust the diaphragm (*and condenser*) to sharpen the image.



SKILL-BASED
ACTIVITIES



ACTIVITY 15

SETTING UP YOUR COMPOUND MICROSCOPE

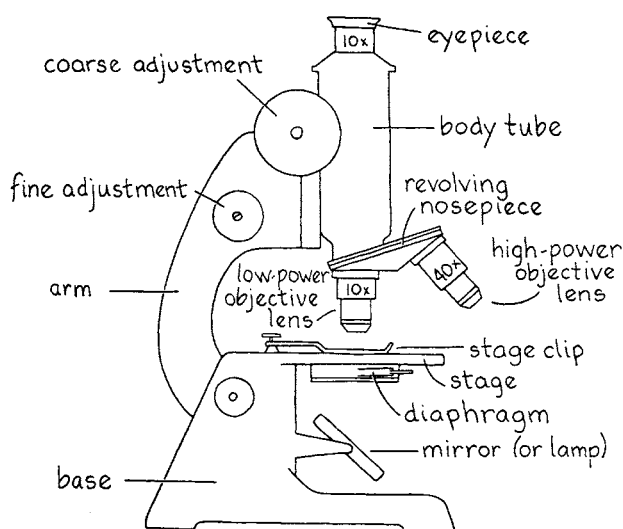
Curriculum Framework Learning Area Outcome
Investigating

Key understanding(s) that opportunities are being provided for:

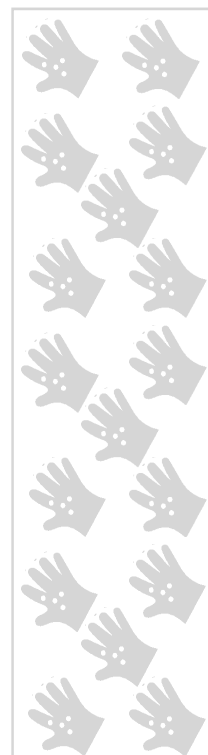
- Students investigate to answer questions about the natural and technological world. In particular, students conduct investigations by knowing how to manipulate equipment to give answers to questions.

Background Information:

The microscope is a very useful tool that enables us to view things that are too small (microscopic) to be seen with the naked eye. Microscopes may vary in complexity and overall appearance but generally have very similar parts. A compound microscope consists of a single tube and eyepiece and uses transmitted light to view objects placed on a clear glass slide. The function of each of the microscope's parts is as follows:



- 1. Eyepiece** - contains a lens that usually magnifies objects ten times (10X).
- 2. Body Tube** - Holds the eyepiece lens and the objective lenses in place.
- 3. Objective Lenses** - these are of different magnifications and usually consist of at least one low power lens (10X) and a high power lens (40X). Some may have three or more lenses.
- 4. Revolving Nosepiece** - contains the objective lenses and rotates to place one lens at a time in position.
- 5. Stage** - a platform on which specimens or slides are placed for viewing.
- 6. Stage Clip** - one or two sliding metal clips that hold specimens or slides on the stage.
- 7. Diaphragm** - allows the amount of light entering the viewing area to be varied by adjusting the size of an opening under the stage.
- 8. Mirror** - directs light from natural or artificial sources up through the diaphragm to the specimen on the stage.
- 9. Coarse Adjustment** - a wheel that allows the body tube to be moved smoothly up or down from the stage.
- 10. Fine Adjustment** - a wheel that allows smaller adjustments to be made to the height of the body tube above the stage so that the specimen can be clearly seen.
- 11. Arm and Base** - form the supporting structure of the microscope.
- 12. Condenser (in some models)** - this focuses the reflected light from the mirror onto the object being viewed.

SKILL-BASED
ACTIVITIES

ACTIVITY 15

continued

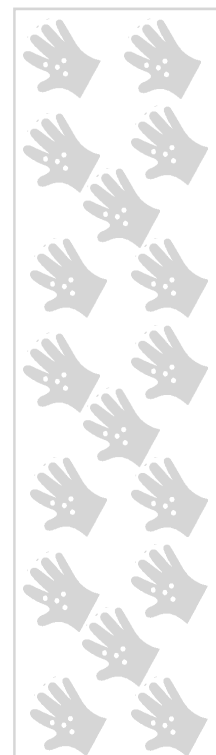
What You Do:

1. Look closely at your microscope and find all the parts shown on the diagram.
2. Find the lenses and check that they are clean and dust free. Use only lens tissue to clean.
3. Place the microscope on the bench with the mirror facing away from you.
4. Remove the eyepiece (*ocular lens*) and carefully place on a clean paper towel. Turn the revolving nosepiece so that the lowest-powered lens is directly under the body tube and look down the tube. Adjust the mirror and/or the light so that you can see a circle of light. You may also need to adjust the diaphragm below the stage. Replace the eyepiece (*ocular lens*).
5. Turn the coarse adjustment wheel towards you to raise the body tube about 3cms above the stage.
6. Use the stage clips to fasten a prepared glass slide into place on the stage.
7. Viewing from the side*, carefully lower the body tube by turning the coarse adjustment wheel away from you until the objective lens is just above, but not touching the slide.
8. Looking into the eyepiece (*ocular lens*), slowly raise the tube by turning the coarse adjustment towards you until the object on the slide comes into focus (*it may help to move the slide around a little*).
9. Once the object comes into focus, sharpen the image by slowly turning the fine adjustment wheel and adjusting the position of the slide if necessary.
10. Further adjustment of the diaphragm and condenser (*if applicable*) will alter the brightness and contrast.

* When using the coarse adjustment to move the body tube downwards, always view the microscope from the SIDE so that there is no chance of damaging the lens by accidentally touching the mounted slide with it.

What You Need:

- A compound microscope
- A prepared slide
- A bench lamp - if needed (*fitted with a pearl globe*)
- Labelled diagram of a compound microscope (p 39)



SKILL-BASED
ACTIVITIES





ACTIVITY 16

STRUCTURE OF HAIR SAMPLES

Curriculum Framework Learning Area Outcome
Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world using reflection and analysis to process and interpret data. In particular, students process data by searching for patterns in results.

Natural and Processed Materials

Key understanding(s) that opportunities are being provided for:

- Students understand that different materials have different properties.

BACKGROUND INFORMATION:

When a forensic scientist is asked to microscopically examine and compare hair samples, a variety of factors are considered including hair diameter, colour, coarseness, medulla structure and granule distribution.

Each hair strand is made up of three distinct layers -

- the **medulla** is a hollow canal that runs the length of the hair. In different racial groups, this canal may be fragmented or it may be absent altogether.
- the **cortex** of a hair strand contains pigment granules called melanin that give the hair its colour. The distribution, shape and colour of these granules of melanin provide important points for comparisons. African American hair is usually curly with unevenly distributed pigment granules, while Caucasian hair is either straight or wavy and contains more evenly distributed granules.
- the **cuticle** is the outer layer of a hair strand and consists of overlapping scales. The scale pattern on human hair is quite different to that of other animals. Scale patterns also vary between each animal species.

The **base** (*root*) of each hair strand is embedded in a tiny skin pocket called a follicle. When a hair is pulled from the skin, this root bulb can be clearly seen.

What You Need:

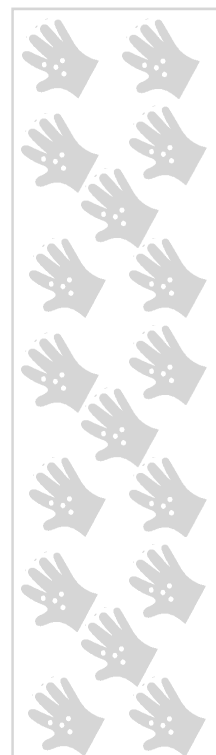
- Strand of hair from three different people
- Clear tape
- A magnifying glass

What You Do:

- Use tape to attach each hair to your sheet of paper.
- Closely observe each strand, first with the naked eye and then with the magnifying glass.
- Record observations about the colour, shape, and length of each hair strand, and note whether the hair bulb was present or absent in each sample.

Extension:

- Obtain a second strand of hair from one of the donors and challenge a friend to match this hair with your samples, using your data plus their own observations.
- Obtain a sample of hair from another animal and use the magnifying glass to make comparisons.

SKILL-BASED
ACTIVITIES



ACTIVITY 17

MICROSCOPIC EXAMINATION OF A HAIR SAMPLE

Curriculum Framework Learning Area Outcome Investigating

Key understanding(s) that opportunities are being provided for:

- Students investigate to answer questions about the natural and technological world. In particular, students conduct investigations by knowing how to manipulate equipment to give answers to questions.

What You Need:

- 2-3 strands of hair
- Hydrogen peroxide
- Tweezers
- Microscope slide
- 3 Petri dishes or small glass jars
- Acetone
(or nail polish remover)
- Water
- Clear tape
- Compound microscope
- Protective gloves

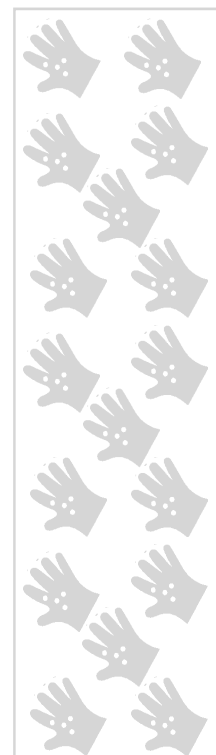
What You Do:

(Requires close adult supervision)

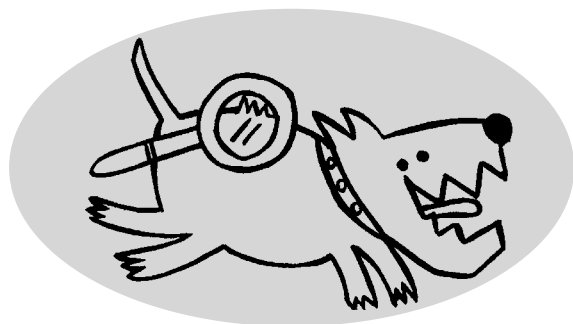
1. Immerse the hair for 2 minutes in hydrogen peroxide (30% solution) to remove (bleach) the colour from the sample. The removal of the colour enables the hair structure to be seen more clearly. *Make sure you wear protective gloves when handling hydrogen peroxide.*
2. Remove from this solution and soak in water for 2 minutes.
3. Remove from water and immerse in acetone for 2 minutes to remove any remaining traces of oil or dirt from the hair sample.
4. Carefully dry the sample and place it on the slide, taping the ends to hold the sample in place.
5. Use low magnification initially to focus, and high (at least 120 X) to examine the structure and appearance of the hair sample. *(To calculate the total magnification, multiply the eyepiece magnification by the objective lens magnification. eg. 15 X for eyepiece and 10 X for objective lens equals 150 X magnification).*
6. Document by sketching and labelling what was seen under high magnification.

Extension:

Obtain a selection of animal hairs (dog, cat, mouse, horse) and prepare as above. Observe under low and high magnification to determine similarities and differences.



SKILL-BASED
ACTIVITIES



CROSS-CURRICULUM ACTIVITIES

Note: Teachers are advised to select, plan and supervise activities with the safety of their students in mind.



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The Arts : Visual Arts

Creature Features *(An Identikit Activity)*

Curriculum Framework Links:
Arts Ideas and Arts in Society

Children work in pairs or threes to create an identikit for creatures (real or imaginary). Some possible approaches could include:

- A model head** (*polystyrene or similar*) with attachable features that could be moulded out of playdough/plasticine.
- Flip Book** with 4 - 5 sections incorporating hair, eyes, nose/ears, mouth and chin sections.
- Outline of head** with attachable pieces. This could be presented on clear acetate and the features built up with overlays, or it could be presented on white card with a 'box of bits'.
- A series of cards** from which selected cards can be placed one under the other to create a face.
- Veggie-man** - created from a potato head with an assortment of features sculptured from other types of vegetables.

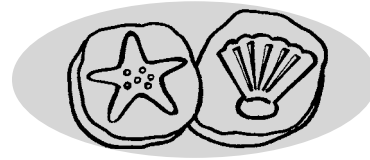
Use of the identikits can be stimulated by:

- presenting a task card, with a written description of an imaginary person/ creature which children have to create using their kit.
- Presenting a 'flash card' showing a picture of a person/creature which children have only a short time to observe before attempting to replicate.

Chromatographic Art

Curriculum Framework Links:
Arts Idea

Use a water-based felt pen to make a circle of colour in the centre of a circle of absorbent paper (*white paper towel, blotting paper*). Support the circle of paper across the top of a glass or cup and drip one or two drops of water onto the coloured spot. Watch what happens to the coloured spot as the water moves outwards away from the centre (*add more drops of water if necessary*). Leave to dry and then use the coloured circles to make a decorative art piece such as a mask or costume, the feathers on an exotic bird or the scales on a fish or dragon.



Plaster Prints

Curriculum Framework Links:
Arts Idea

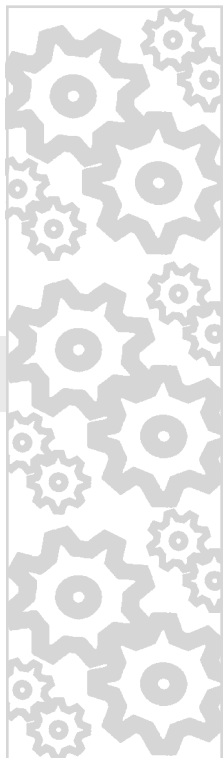
Use shells, unusual shaped nuts and dried objects to make deep imprints into damp sand in an icecream container or similar. Half fill a yoghurt container with water, and using a wooden popstick, stir in sufficient Plaster of Paris powder to make a thick paste. Quickly pour the paste into the imprints, filling them level with the sand. Leave to set, then remove the plaster casts and dust off excess sand. Hands, feet and shoes can also be used to make imprints in the sand for plaster casts.

***Do not tip left-over plaster down a sink or drain as it will harden and permanently block the pipe.*

Draw a Description

Curriculum Framework Links:
Arts in Society

Arrange for a visitor dressed in a memorable outfit to come into the classroom and do something unusual (*open a window, shift a desk, move the bin*) and then leave. Challenge the students to draw the visitor from memory in as much detail as possible. Students can work in groups or as individuals, and can concentrate on either the whole person or on an assigned portion eg. shoes or head. Invite the visitor to return so that children can compare their drawings with the actual person.



CROSS -
CURRICULUM
ACTIVITIES



SCIENCE



Cabbage Chemistry

Curriculum Framework Links:
Natural and Processed Materials

Chop up half a red cabbage, cover with water and simmer 10 -15 minutes. Strain and retain the liquid and discard the solids. The red juice obtained in this way can be used as a natural indicator to show the chemical nature of liquid substances. When a small amount of the cabbage juice is added to a liquid substance, a colourful reaction occurs. If the substance is acidic in nature, the solution will turn a bright red; if the substance is alkaline or basic in nature, the solution will turn green or bluey-green. If the substance is neutral (*neither acidic or basic*) then no reaction will occur. Powdered or solid substances can be prepared for testing by mixing them with water first.

Kim's Game (Observation)

Curriculum Framework Links:
Investigating

Place a selection of different objects (*10 -15 objects*) on a large tray. Cover the objects with a cloth. Advise students that they will be allowed to view the objects for 30 seconds. The objects will then be hidden from sight and children will be asked to list as many of them as they can remember. Challenge students to also describe the listed objects in detail. Suitable objects could include a key, plastic toy, leaf, seedpod, torn scrap of paper, lolly wrapper, brooch, fancy button, bus ticket, foreign coin, scrap of fabric, postage stamp, coloured pebble, fragment of glass/pottery, business card, eyedropper, or a piece of string. Increase the difficulty by extending the number of objects or by including objects that are similar but not identical in appearance.

Fibres And Fabrics

(Requires close adult supervision)

Curriculum Framework Links:
Natural and Processed Materials

Obtain a selection of fabrics made from different fibres (*such as wool, rayon, silk, cotton, linen, and hemp*). Cut the fabrics into small squares. Take one sample square of each fabric and using large metal tweezers/tongs, hold each one over a candle flame until each square has been reduced to ash. Select the fabric ash that best retains its shape and doesn't disintegrate too rapidly and carefully place it in a clear container (*plastic box or jar*). Challenge students to find out which fabric burns to form the same ash residue as your sample. This activity is best undertaken in a well-ventilated location with carefully considered safety precautions.

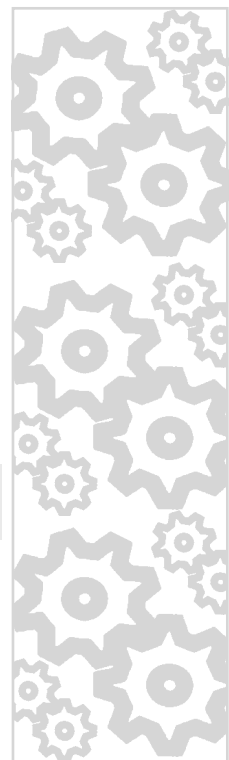


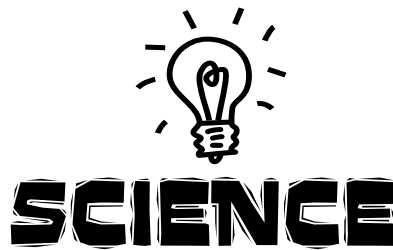
Reading The Ashes

(Requires close adult supervision)

Curriculum Framework Links:
Natural and Processed Materials

Use a biro to write a message on a sheet of paper. Crumple the paper into a ball, place it in the middle of a metal tray and set it alight. When the paper has burnt completely, allow the remains to cool undisturbed. Mix 1/2 cup of glycerine with 1 1/2 cups of water in a spray bottle. Gently spray the burned paper with the mixture until it is thoroughly wet then carefully unfold the paper, laying it out flat on the tray. Now see if you can read any of the writing on the wet page.





DNA Matching

Curriculum Framework Links:
Investigating

A completed DNA profile prepared by a forensic scientist looks very similar to the bar codes used on shop products. Scientists match DNA profiles by comparing the characteristics of each band. Similarly, bar codes can be matched by comparing the pattern of lines, the width of individual lines and the distance between them. To give students some experience with this technique, obtain two sets of a range of different bar codes from your local supermarket or retail store. Display five bar codes plus an unknown that matches one of the five on display and challenge students to match the unknown bar code.

Hidden Messages

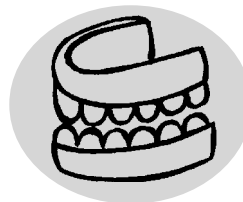
Curriculum Framework Links:
Investigating

Use a biro or sharp pencil to print a simple message on the top sheet of a pad of paper. Tear off the top sheet of paper and carefully observe the sheet underneath. See if you can read the imprinted message by holding the sheet up to a light source. Now lay the sheet flat on a table and use a soft-leaded pencil to gently shade over the area where the message was printed. If this is done carefully, the graphite from the pencil will shade the paper around the indentations so they show up as white impressions. Can you read it now?

The Mystery Solvers

Curriculum Framework Links:
Science in Society

Invite guest speakers from the field of forensic science into your classroom to talk to students about their speciality. Prepare students for their visits by allowing research and discussion time beforehand so that each student can determine the questions that they would like answered. If possible, forward these to the guest speaker so that they too can be prepared.



Tell-Tale Teeth

Curriculum Framework Links:
Investigating

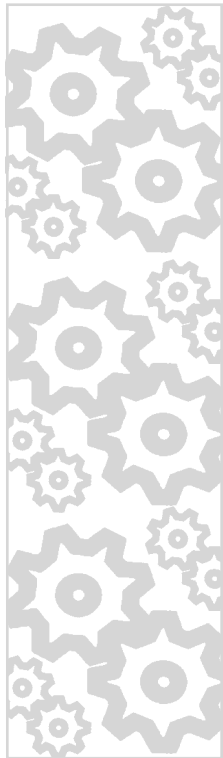
Make a batch of playdough using flour and water, and divide it into small portions. Place students into working groups and instruct each student to bite into their piece of dough to leave clear impressions of their top and bottom teeth. Dry the dental moulds in the sun or an oven, keeping them separated into groups. Challenge students to identify their own and others dental moulds through careful comparison. *(A slice of processed cheese will also provide distinct teeth impressions for comparisons.)*

Following Footprints

Curriculum Framework Links:
Investigating

Have students paint the bottom of one foot, or the bottom of one of their old shoes with watercolour paint and make one or more prints onto a sheet of paper. This activity can be varied to suit a number of different activities.

- The prints can be collated and made into class sets for matching activities.
- Sit students in a circle, each with a copy of their own footprint and play a game of Twenty Questions. The teacher has an extra copy of one of the students' footprints and answers students' questions about it with a yes/no answer. Students attempt to find out if it is their footprint.
- On a large sheet of paper, students can do a simple activity such as skip, hop, jump, tiptoe, walk backwards, dance or similar, with painted feet. Other individuals or groups can then be challenged to guess what activity was being carried out in order to form a specific pattern of prints.





Descriptions

Curriculum Framework Links:
Viewing

Obtain a selection of photographs or pictures of assorted people from magazines or newspapers. Choose one of these and allow a selected student a limited time to look at the picture and try to memorise important details. The student then describes the person to the class giving as many details of facial features, colouring, clothing and identifying marks as can be recalled. A selection of pictures, including that of the person described, is then displayed. Based on the oral description given, students attempt to select the correct picture.



Sequencing Events

Curriculum Framework Links:
Writing

A range of approaches can be used to give students practice in logically sequencing events. Some examples are as follows:

- Cut comic strips into single frames for students to correctly arrange.
- Have students write a series of paragraphs to form a simple action story. Cut into paragraph sections for others to rearrange to form a logical story.
- Plan a simple action story and have a group of students each act out one scene or action, but not in the correct order. The remainder of the class has to rearrange the scenes to form a logical story. The players can be requested to perform as often as required. Instructions can be presented on a series of cards so that no verbal clues are given and these can then be distributed in random order.

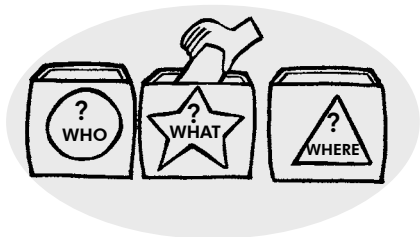
Curriculum Framework Links:
Speaking

- Students can work in pairs to give each other detailed instructions on how to carry out a simple activity/action such as combing their hair or catching a ball. Students must do only as instructed. This activity can be carried out with or without props.

Make Your Own Mystery

Curriculum Framework Links:
Writing

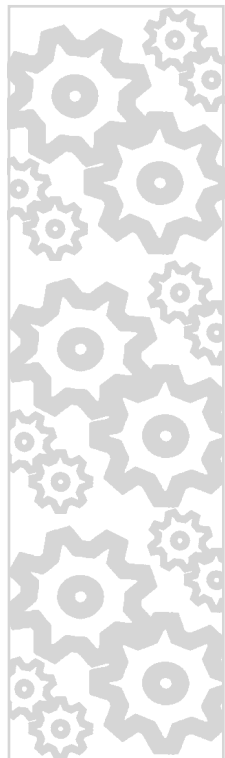
Set up three boxes labelled Who? What? and Where? Each box contains cards with some information that must be incorporated into a story. Students select one card at random from each of the three boxes and create their own mystery story using this basic information to construct the story. It may be easier and more enjoyable to have students work in pairs for this activity and orally record their story from the written original.



Mysteries, Mischief and Mayhem

Curriculum Framework Links:
Writing

Make a class collection of stories that focus on the solving of mysteries. Ask the school librarian to create a display of mystery books. Read some of these to your students. Display students' own mystery stories or collate them to form a class book.





Another Point of View

Curriculum Framework Links:
Attitudes, Values and Beliefs

Invite students to select a simple fairy story which includes a villain, such as the wolf in Red Riding Hood, the troll in The Three Billy Goats Gruff, the mole in Thumbelina, the wolf in The Three Little Pigs or the giant in Jack and the Beanstalk. Challenge students to present a case in support of the villain's behaviour. Through an activity such as this, students can be made aware that there are two sides to every incident and that things are not always as they seem.

(eg The troll spent many weeks building a bridge over the creek for his own use. The goats merely watched him and laughed at all his hard labour. However, when the bridge was complete, the goats began to use it on a regular basis, tearing the flimsy boards with their sharp little hooves and waking up the nocturnal troll with all their noise. This annoyed the troll so much that he tried to prevent them from going across. They could have easily used the other bridge further up the creek but enjoyed making the troll cross. So he pushed them into the shallow water and made them wet.)

Spot The Difference

Curriculum Framework Links:
Viewing

Arrange students into two lines facing each other and instruct each to carefully examine the person directly opposite them. Explain that in one minute their partner will change something about themselves and they will have to try and spot the difference. Allow about a minute for observation and then ask students to turn in the opposite direction while their partners make a small but visible change to their appearance eg. untie a shoelace, tuck in shirt, roll up a sleeve, remove glasses, tuck hair behind ears, place jewellery/watch on other wrist/hand. Instruct students to face inwards again and silently observe their partner to 'spot the difference'. Allow a short time before students have to state the change identified.

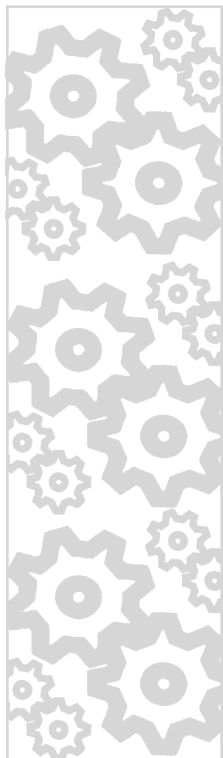


Reporting *(Critical Literacy)*

Curriculum Framework Links:
Viewing

Invite a visitor to enter the classroom and to do something bizarre such as tip the rubbish on the floor, search through cupboards, throw a handful of confetti on the students or spray them with water. After the visitor has left ask students to describe what actually happened. When students make an inference rather than an observation, ask them if they are making assumptions (guessing) or know it to be true.

This activity can be run in conjunction with the Art activity of 'Draw a Description'.



CROSS -
CURRICULUM
ACTIVITIES



SOCIETY AND ENVIRONMENT

Fact Finding On Forensics

Curriculum Framework Links:
Investigation, Communication & Participation

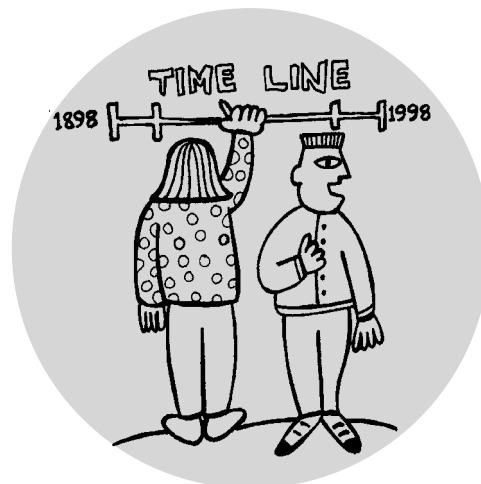
Display a list of forensic science techniques that are now in common use and let students select one that they would like to research. Students can be required to explain the technique and its application, detail the historical development of the technique, and discuss similar strategies that are no longer in use. Encourage students to present their information in interesting and different ways. These could include taped interviews, oral reports, written presentations, use of photographs, pictures and overhead transparencies, practical activities and demonstrations.



Famous Crimes

Curriculum Framework Links:
Time, Continuity & Change

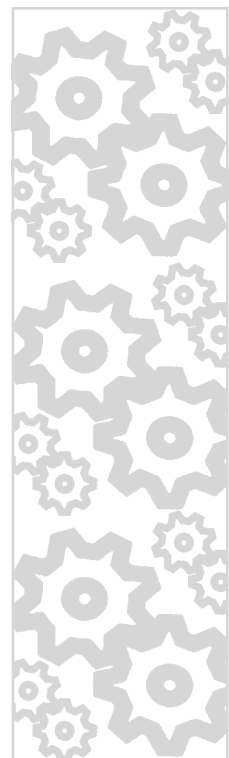
Students may enjoy reading or listening to stories about famous crimes committed in different countries of the world, and how they were solved. These do not have to include controversial material but could perhaps include stories involving robbery (*Ned Kelly in Australia, the Highwaymen in England, the Great Train Robbery in England*), theft, counterfeiting, impersonation, smuggling, espionage or similar.



Forensic Time Line

Curriculum Framework Links:
Time, Continuity & Change

The creation of a time-line showing the major developments in Forensic Science can form the basis of an on-going whole-class activity. Students can work in pairs or small groups on developments and inventions within a particular time-frame, or, after researching the development of a specific forensic technique, can show this information on the class time-line.

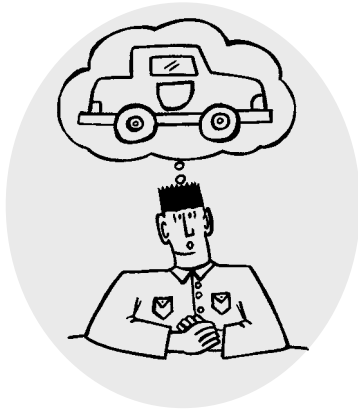


CROSS -
CURRICULUM
ACTIVITIES



MATHEMATICS

Can you work these out?



Witness Recall

Curriculum Framework Links:

Working Mathematically

OUTCOME 5:

Investigate, generalise and reason about patterns in number, space and/or data.

Police Officer:

Did you get the number of the licence plate?

Accident Victim:

Yes. It was in two parts: a two digit number and a three digit number. The two digit number was prime and the sum of the two digits was a two digit prime. The first digit was larger than the second digit. In the three digit part, the digits were all odd and different. The sum of the three digits was palindromic. The sum of the first and third digits was one-half the sum of the first and second. That's all I remember!

Police Line Up

Curriculum Framework Links:

Working Mathematically

OUTCOME 5:

Investigate, generalise and reason about patterns in number, space and/or data.

Can you place the 'suspicious' characters in this line-up in order from shortest to tallest?

- Sally is taller than Paul.
- Paul is taller than Ulrich.
- Ulrich is taller than Sue.
- Sam is taller than Ulrich, but shorter than Paul.
- Colin is standing between Ike and Ian, who is shorter than Sally, but taller than Colin.
- Ursula is standing between Sally and Olive, who is standing next to Ian.
- There are seven people standing between Ursula and Sue.

Can you fill in the names of the suspects?

(It's easier if you cut out ten slips of paper, or use a grid.)

Dash for Cash

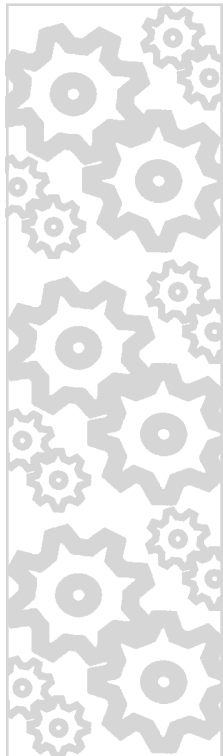
Curriculum Framework Links:

Working Mathematically

OUTCOME 5:

Investigate, generalise and reason about patterns in number, space and/or data.

Five bank robbers ran out of the bank. Ann was fastest. Bob was slowest. Dianne was ahead of Cherie, and Eddie was just behind her. Only the first two got away. Who was caught?



CROSS -
CURRICULUM
ACTIVITIES

Witness Recall: (83 173)
Police Line Up: From shortest to tallest: Sue, Ulrich, Sam, Paul, Ike, Colin, Ian, Olive, Ursula, Sally - (Initials spell SUSPICIOUS)
Dash for Cash: The order was Ann, Dianne, Cherie, Eddie, Bob. So Cherie, Eddie and Bob were caught.

SOLUTIONS



MATHEMATICS

Curriculum Framework Links:

Working Mathematically

OUTCOME 3:

Call on a repertoire of general problem solving techniques and outcomes. Investigate, generalise and reason about number, space and/or data

Line-Up Logic

Solve these problems with your group. Use the clues from the envelope to put the name labels in the right order. Discuss the best way of getting started. Try different solutions, and then come to a conclusion. How well did your group work?

There are 2 puzzles below. Photocopy and cut out the six clues for each puzzle and the names. Place them in an envelope and give each set to a group of students.

Line-up 1 - CLUE 1

Kylie is almost the tallest.
Owen is almost the shortest.
José was disappointed that he couldn't stand next to John.
Who is standing next to whom?

Line-up 1 - CLUE 2

Kevin has three kids on each side of him in the picture.
Who is standing next to whom?

Line-up 1 - CLUE 3

John and Louise are standing on the ends.
José and Angela are not next to each other.
Who is standing next to whom?

Line-up 1 - CLUE 4

Owen is the only boy that is standing between two girls.
Angela didn't get to stand next to her best friend.
Who is standing next to whom?

Line-up 1 - CLUE 5

The students are lined up from tallest to shortest.
Who is standing next to whom?

Line-up 1 - CLUE 6

There are 7 students in this line-up.
Angela and Louise are best friends.
Who is standing next to whom?

Line-up 2 - CLUE 1

The ten suspects were lined up by age.
Emma is older than Trish.
Red is older than Ted.
Jack is younger than Vic.

Line-up 2 - CLUE 2

Red is younger than Trish.
Sally is younger than Joe.
Emma is younger than Todd.
Who ate the pecan pie?

Line-up 2 - CLUE 3

Al is older than Red.
Todd is older than Joe.
Trish is younger than Sally.
Two people ate the pecan pie.

Line-up 2 - CLUE 4

Al is younger than Trish.
Emma is older than Vic.
Joe is younger than Jack.
The two in the middle are guilty.

Line-up 2 - CLUE 5

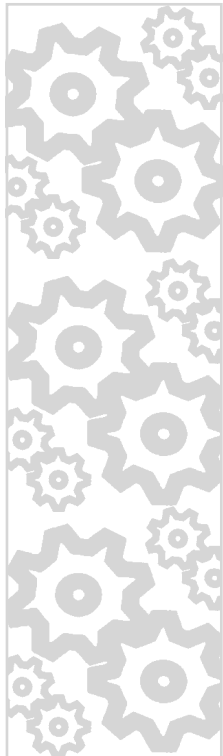
Emma is older than Ted.
Vic is older than Red.
Sally is younger than Jack.

Line-up 2 - CLUE 6

Al is younger than Joe.
Trish is younger than Todd.
Emma is older than Al.

KYLIE	OWEN	ANGELA
KEVIN	JOSE	JOHN
	LOUISE	

AL	TED	VIC
JACK	EMMA	JOE
SALLY	RED	TODD
	TRISH	





RESOURCES



Note:

Many of these resources are available from the Scitech Discovery Shop.

Alex.

Allan, T.

Asimov, I.

Asimov, I.

CSIRO's Double Helix Club.

Dahl, R.

Discover Science.

Discover Science.

Fischel, E.

Fletcher, H. J. (1980).

Fowler, M. and Parekh, R.

Hiotis, H., & Rome, A. (1997).

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Lynch, B. F. (1994).

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Oliver, M.

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Usborne Solve It Yourself.

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Wiese, Jim. (1996).

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Under Cover Detective Activity Kit.

Mystery on Main St. Usborne Puzzle Adventures.

Asimov's Mysteries. Panther.

I, Robot. Panther.

Forensics Science Kit. CSIRO's Double Helix Science Club.

Revolting Rhymes.

Forensic Detective Kit.

Spy Master Kit.

Murder Unlimited. Usborne Whodunnits.

Secret Codes. Franklin Watts.

Codes and Ciphers. Usborne Superpuzzles.

Solve it! Investigations into analytical chemistry and forensic science. ICI Australia.

Detection. (Kit)

Crime Lab Chemistry: Teacher's Guide. Lawrence Hall of Science.

Fingerprinting: Teacher's Guide. Lawrence Hall of Science.

Of Cabbages and Chemistry: Teacher's Guide.
Lawrence Hall of Science.

Mystery Festival: Teacher's Guide. Lawrence Hall of Science.

Forensic Science: Basic techniques in physical evidence examination. SCIOS, 29(3), pp. 2-5.

Making Faces. Angus and Robertson.

Fun with Fingerprints. (Kit)

Spymaster Code Kit. Oliver. M.

The Deckchair Detectives. Usborne Whodunnits.

Spying for Beginners.

Secret Codes.

Where is the Pirate's Treasure?

Who Stole the Black Diamond?

Who Shot the Sheriff?

Who's Haunting the House of Horror?

Detective Science. John Wiley & Sons, Inc.

Spy Science. John Wiley & Sons, Inc.

Websites

National Institute of Forensic Science

Centre for Forensic Science, UWA

Murdoch University, forensic links

ABC Science

<http://www.nifs.com.au/>

<http://www.forensicscience.uwa.edu.au>

<http://www.science.murdoch.edu.au/teaching/m235/forensicaust.htm>

<http://www.abc.net.au/science/slab/forensic/default.htm>